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A NARROW ESCAPE.



# WALTER AT THE SEA-SIDE;

OR,

FACTS AND FANCIES ABOUT THE  
SHORE AND THE DEEP.



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\* What hid'st thou in thy treasure-caves and cells,  
Thou hollow-sounding and mysterious main ? "

MRS. HEMANS.

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EDINBURGH; AND NEW YORK.

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## Preface.

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**T**HE writer's object in the following unpretending pages has been twofold : to *instruct*, and to *amuse*. To *instruct*, by bringing before the young reader a variety of valuable details in relation to the common objects of the sea-shore and the denizens of the mighty deep ; to *amuse*, by clothing these details in lively language, by illustrating them with anecdote and quotation, and by interweaving with them certain episodes of peril, enterprise, and adventure.

Many years have elapsed since Dr. Aikin and his sister composed their agreeable little narrative of " Eyes and No Eyes," yet its moral is one that requires to be constantly enforced upon the attention of parents and children. Thousands migrate every summer to the sea-side, apparently for no other purpose than to beguile the time with sea-bathing and listless promenades ; or, in the case of the young, to build castles of sand and gather shells. How much more pleasantly would they pass their leisure, whether young or old, if they learned to keep their eyes open ; if they studied the habits and modes of life of the strange creatures floating in the rock-pool or crawling over the

weedy beach ; if they brought themselves acquainted with something of the beauty, and power, and wonderfulness of Ocean !

The writer trusts that the perusal of his little volume will be found useful in this direction, and will show the youthful student how much amusement may be derived from a visit to the sea-side by those who make a good use of their eyes. And it may serve, perhaps, as a stimulus and encouragement to the study of Natural History—that one of all the sciences which affords the most unalloyed gratification ; which most clearly reveals to us the love and mercy, no less than the power and wisdom, of the Divine Creator ; which forces from our souls the rapturous exclamation : “ O LORD, how manifold are Thy works ! In wisdom hast Thou made them all ! The Earth is full of Thy riches ! ”

From idler pastimes let us turn awhile  
Where Nature glows in Heaven's irradiant smile :

But not to dell or glen, or vale or bower,  
Do we now dedicate a passing hour ;

Not to the swelling hills, that greenly rise  
To catch the lights and shadows of the skies ;

Not to the forest dense, that proudly bears  
The burthen of a thousand toiling years ;

Not to the stream, that sparkles through the shade,  
And fills with music all the echoing glade ;—

But to the Ocean, with its voice of might,  
Its depths sublime, its face of glorious light ;

The long bold line of cliffs, the weedy strand,  
The level surface of the ribbed sand ;

The rocky pools, that teem with novel life ;  
The clanging breakers, and their ceaseless strife :

To these we turn, and, worshipping, adore  
The Power Divine that bade such marvels be ;—

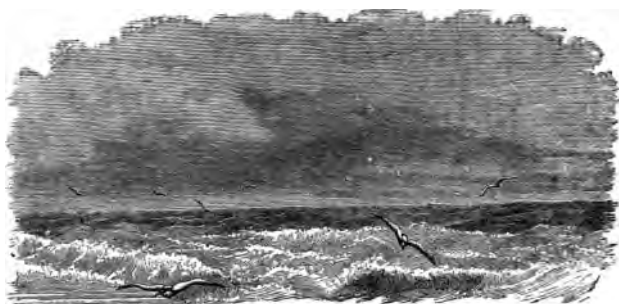
The wonder and the beauty of the Shore,  
The glory and the mystery of the Sea !



## WALTER AT THE SEA-SIDE.

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### CHAPTER I.



**I** DON'T think I shall ever know much of natural history," said Walter Somerville to his cousin, as they leisurely paced along the High Street of a favourite watering-place in the south-west of England,—“I don't think I shall

ever know much of natural history—zoology—or whatever you call it. Oh, it is such dull work ! ”

“ Dull ! ” exclaimed young Arthur Vernon—  
“ dull ! Why, it’s the most agreeable of studies ; and, by-the-by, I don’t know any better place for pursuing it than the shore of the ‘ mighty and mysterious main.’ ”

“ Oh, its hard names are enough to frighten any fellow ! I tell you, Arthur, I must give it up. I have tried it, and can do nothing with it.”

“ That, I am afraid, is because you have not got a sufficiently keen edge to your sword Balmung.”

“ Sword !—Balmung ! Come, Arthur, that’s another of your puzzles. Now, tell me what you mean by *that*.”

“ Well, in an old, very old, German poem called the *Nibelungen Lied*, you may read of the doings of a heroic knight named Siegfried. This knight was the fortunate possessor of a wonderful enchanted sword—the sword Balmung—which had been forged by the famous smith Mimer. And when he forged it, Mimer determined it should be the sharpest sword in the

world. As soon as he had finished it, he went straight into the presence of the king, and with his newly-tempered blade cut asunder 'a *thread* of wool floating on water.' Loud was the king in his admiration of the weapon, but it did not satisfy the smith. He returned to his forge, sawed the blade in pieces, welded it in 'a red-hot fire for three days,' and tempered it with milk and oatmeal. Then he went again into the presence of the king, and this time he severed a *ball* of wool as it floated on the water. 'Marvellous!' exclaimed the king; and 'Marvellous!' echoed his knights and barons. But Mimer looked discontented, took up his sword, and wended his way homeward. Once more he blew up his fire, and hammered, and welded, and tempered this said Balmung, working night and day for seven weeks. Then he went for the third time into the presence of the king, and seeing a whole *pack* of wool floating on the water, he split it asunder at one stroke. This wonderful achievement so startled the king that he could not speak; and as for Mimer, he owned himself contented. He had put, you see, the finest possible edge to his sword, Walter;

and had worked and worked until he had obtained success."

"That's a good story," said Walter, reflectively; "and I see what you mean. You would have me give more of my mind to my new study, and keep on until I am completely master of it. Well, I'll make another trial; but still I say and declare that natural history is dull—*dull*—DULL!"

"Nay, Walter," observed his cousin; "you think it dull because you know nothing of it; just as the savage despises a lump of gold from his ignorance of its value. But, surely, it is not dull to examine the habits of the beautiful winged birds—their little loves and quarrels, their ingeniously built nests, their contrivances for flight, their various powers of song; or the manners and customs of the finny populace of ocean, from the warm-blooded and gentle, though gigantic whale, down to the little invisible animalcule that builds up the white coral reefs and radiant coral islands; or the numerous members of the great animal world, so different in their powers and faculties, so distinctive in their structure, so glorious in their aspect, yet

all bearing eloquent witness to the wisdom and goodness and omnipotence of their Creator. No, Walter; don't call natural history, or any other science—nay, nor any art either—*dull*, because to one who understands and reflects, who knows or wishes to know, it is full of the highest interest, and more attractive than any romance."

During this conversation, Walter and his cousin continued their progress down the High Street of Oldport—a curious but pleasing combination of busy, tarry, fishy, briny shipping-town, and gaudy, noisy, smiling, fashionable bathing-place—and quickly found themselves on its little pier, which, by throwing out at its extremity an arm towards the right, enclosed, with the help of a ridge of rocks on the opposite side, a small harbour, of sufficient depth of water for fishing-boats and smacks, and amply protected from the more dangerous winds.

Walter Somerville was the son of a widow of moderate circumstances, who had visited Oldport for the purpose of enabling him to enjoy his holidays and recruit his strength by the



sea-shore, rightly believing that the finest tonic in the world is the fresh air which blows over leagues of "windy sea." She had found with much pleasure, on her arrival, that her sister's family were also staying at Oldport during the vacation ; for she knew that Walter could have no better companion than his cousin Arthur Vernon, a lad of seventeen, scarcely less remarkable for his acquirements and love of knowledge, than for his generosity of disposition and purity of mind. They were warm friends, though Walter was much younger than his cousin, to whom he looked up with almost the reverence a good son pays to his father : they were warm friends ; every day they spent hours together ; and already they had explored in company much of the charming and picturesque scenery which surrounded the town of Oldport.

For the attentive observer, for a mind imbued with a love of the beautiful, for an imagination capable of conceiving the wonder and perfection of God's revelation in nature, Oldport was a delightful locality. Magnificent sea views and romantic land views blended together in that complete harmony which is the grand charac-

teristic of the Divine work. Inland there were leafy valleys, where, even in the noonday, a soft subdued shade prevailed ; where clear brooks made such music that you might fancy the flowers inclining their heads to listen, as if fearful they should lose a note of its exquisite sweetness : inland, I say, there were broad " reaches " of green pasture and golden corn-field, over whose varied surface the wind came and went in alternate waves of shadow and sunlight ; and swelling hills, from whose summit the spectator looked down upon a panorama of wonderful interest—the waters dimpling in the glory of the heavens, the earth making ready for the joy of harvest, and, near in shore, the busy fishing-boats collecting their share of the spoil of ocean : inland, too, were the greenest of green lanes that ever rejoiced in the bloom of hawthorn hedges and the pride of elm and beech, of oak and chestnut—the greenest of green lanes that ever wound through deep red banks, heavy with fern and blossom and ivy and honeysuckle, while their echoes blithesomely repeated the mingled songs of a hundred birds—the greenest of green lanes that ever strayed past trim

**FISHING.**

cottage and quiet pond, past the haystack and the cornrick, the meditative cattle in the rich meadow, the young colt neighing in his grassy paddock, the squire's neat white mansion looking out on gay garden and well-kept lawn, and the old, old church, whose massive tower and ivy-shrouded walls seem in such solemn keeping with the ever-silent graves.

If such was the character of the inland

scenery, not less attractive were the prospects that greeted the wanderer from the shore. Long lines of cliff stretched far away on either hand until they vanished in the misty distance ; you could trace them by the edging of white surf which told where the billows broke, chafing and foaming, against their rocky base. Here and there the stately rampart had given way before the attacks of its restless enemy. In the hollows thus effected the waters sank into silence ; and, as if satisfied with the victory they had achieved, contented themselves with gently kissing the smooth surface of yellow sand. At other points the earth had seemed anxious to curb the violence of its mighty antagonist, or at least to break its force, by throwing out rocky promontories and isolated crags, over which, at high tide, the waves kept a ceaseless eddying and whirling—like tigers quarrelling over their prey—but whose sides at low water stood bare and naked in the sun, except for the drapery of seaweed dependent from them, and partly concealing the scars and wounds they had received.

Bounded only by the remote horizon—beyond

and about all this—extended the grand, ever new, ever old, and all-powerful ocean :—

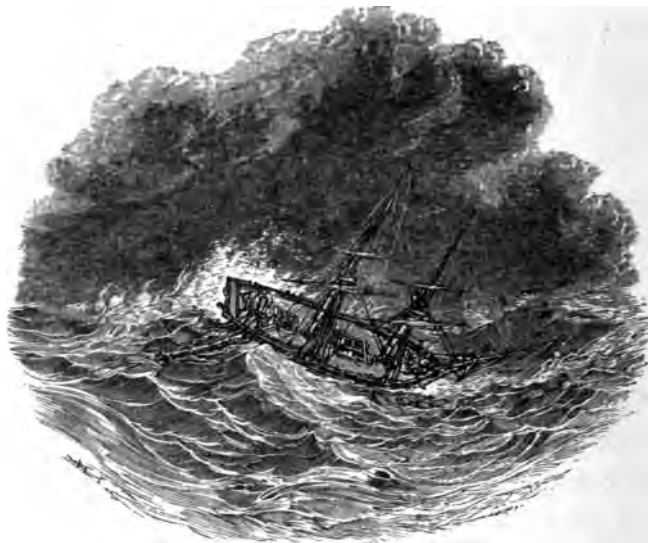
“ The ocean with its vastness, its blue green,  
Its hopes, its fears ;  
Its voice mysterious, which whoso hears  
Must think on what will be, and what has been.”

I sometimes think that if we had never anything else to gaze upon but this same mysterious ocean, we would never weary. There is no sameness in its aspect, no monotony ; like the human face, it changes every moment from grave to gay, from gentle to severe. It seems so unimpressible, so massive, so immutable ; yet do but look, and you shall see it affected by the mere influence of a passing cloud. A ray of sunshine lights it up with an exultant smile ; a breath of wind so stirs up its waves that they frolic in their glee, like young kids upon the mountain ; the hurricane comes, and convulses it with wrath and terror ; the summer noon beams upon it, and lo, it subsides into a slumber soft as that of infancy ! Now it shines like one vast sapphire, transparently and intensely blue ; now it has the green glow of an emerald, streaked here and there with strange purple shades. At sunrise a pearly mist floats over it

like a veil ; at sunset it *welters* in blood-red and gold. Never the same ; always, always changing. And with such a singular sympathy between it and the sky, that it incessantly reflects the latter's moods, and is bright or dull, serene or disturbed, even as is its celestial sister.

Then consider what a world of romance and mystery—of “ hopes and fears ”—of human endurance, suffering, and triumph—is associated with it. The *sea* !—oh, the deep significance of that word ! It means battle and wreck, and the cries of the drowning, and the sleep of the drowned ; and the rejoicing of strong men, from the day when the bold seamen of the *Argo* first put forth upon it to the present time, when its ways are crowded with men's argosies. It means the sorrow of the widowed wife, and the long agony of Rachel yearning for her children, and the sickening desire of the heart for the loved and lost. It means the triumph of human valour, of human patience, and human genius in the stately ship that goes careering over the waters, “ like a thing of life,” to its destined port, with its white wings bravely filled by the blessed airs of heaven. It is sad to think of

the poor storm-beaten vessel, with canvas rent and masts shattered, tossing to and fro at the mercy of



THE WRECK.

the billows ; it is sad to realize some such painful scene as the poet has so finely painted :—

“ Our sea-breached vessel can no longer brave  
The floods that o'er her burst in dread career ;  
The labouring hull already seems half-filled  
With water, through an hundred leaks distilled ;  
Thus drenched by every wave, her riven deck,  
Stript and defenceless, floats a naked wreck ;  
At every pitch the o'erwhelming billows bend  
Beneath their load the quivering bowsprit's end :

At either pump our seamen pant for breath,  
In dire dismay, anticipating death ;  
Still all our powers the increasing leaks defy,  
We sink at sea, no shore, no haven nigh."

It is sad, in truth, to think of all the misery and despair this gloomy picture foreshadows ; but oh, it is noble to think of the gallant lifeboat,



THE LIFEBOAT.

manned by hero-hearts, and driven by hero-arms through the angry flood and the tempestuous night, to the rescue of the sinking seamen !



It is sad to think of a *Birkenhead* going down —down—down in the waste of waters, with its precious freight of living souls — of valour, love, and hope, and faith; of a *Royal Charter*, hurled upon perilous rocks in sight of home; of many a good ship so swallowed up by the remorseless sea that the eye of man has never lighted upon their traces; but it is glorious to think of a Columbus, steadfastly guiding his bark over the unknown ocean in search of a New World; of a Cook, revealing to human knowledge the palm-fringed coral isles that stud the surface of the Pacific; of a Ross and a Parry and a Franklin, braving the towering iceberg and the crashing icefloe in their persistent efforts to unlock the secrets of the Pole; of a Sir Humphrey Gilbert, tempest-tossed in his little pinnace, and facing death with unquailing spirit, for “Courage!” said he; “we are as nigh to heaven on the sea as on the land.” If ocean has its bitter memories, surely also it has its associations of joy and triumph; and men have more reason to welcome it as a friend than to dread it as a foe.

But I have left Walter and his cousin all this

time—while the reader and I have been dreaming dreams—on the Oldport pier. They have not been unamused. A small steamer has put in from some distant port; fishing-boats have been depositing the rich spoils collected in the preceding night; others have put forth again, and outside the harbour have dropped their heavy nets; a gay wherry or two, with its load of “visitors,” has rowed away to view the wonders of the coast; bare-legged boys have been wading in the sunlit waters, filling the air with shouts of merriment; and on a strip of sand, to the right of the pier, the quaint, ugly, but useful bathing-machines have been carrying up and down their laughing patrons. Walter and his cousin have found much to see and much to talk about. To an observant eye the dullest scene will present *some* feature of interest. There are men and boys who would see nothing in a tropical forest or the Bay of Naples; others would be absorbed and enraptured among the sands of Sahara. It all depends upon whether we have cultivated the habit of *seeing*. The eye must be educated, like the hand. And the sight of many persons is so indifferent that no

spectacles ever provided by author or artist will enable them to see !

Contented at last with the bright scene of the pier and harbour, Arthur led his young cousin down a flight of steps, and proposed a stroll along the beach. It was a glorious morning : the sun shone brightly ; the sky was dappled with fleecy clouds which made its breadths of blue seem bluer still,—

“ Darkly, deeply, beautifully blue ; ”

the air was warm and *summery*, but prevented from being oppressive or enervating by the fresh vigorous breeze which came inland, loaded with the breath of ocean, and, therefore, our two young friends felt as if walking among the glades of Paradise—which, indeed, we all might do, if our hearts were pure, our consciences clean, and our souls filled with a true sense of the goodness and grace of God. I cannot record the whole of the happy conversation which passed between them. There was no lack of objects to delight and interest, to suggest remark and anecdote. And Arthur, drawing upon his stores of information, poured into his young cousin’s ear a continuous stream of pleasant talk.

"You were referring to Natural History, Walter, as a something inconceivably dull," said he; "let us test the truth or no-truth of your remark. What have you in your hand?"

"Oh, this is a stupid thing—'five-fingers,' they call it about here—a kind of star-fish, you know; I don't see anything in it either pretty or useful."

"Nothing pretty!" exclaimed Arthur; "why, observe its exquisite shape; it reminds you of the French cross of honour, with its five rays; it is as perfect as if designed by a mathe-



STAR-FISH.

matician. Its colour, too—a pale, reddish yellow, lighter on the under surface—is surely beautiful. I must tell you, however, that the colours of the star-fish are very various; some are of a yellow gray, others of a ruby red, and others again of a dark violet. And, besides, some of the species have more than five arms, though these are seldom found on our English shores."

"What! are there star-fishes in foreign countries?"

"Oh yes; you will find them in almost every sea, north, and south, and east, and west; but the most beautiful kinds inhabit the warm tropical waters. They are generally found at moderate depths, but not a few species descend as low as a hundred and fifty fathoms."

"A fathom?—let me see; how many feet make a fathom?"

"Six; and a hundred and fifty fathoms are equal to nine hundred feet, or thrice the height of yonder cliffs, so that you may fancy what a weight of water these seemingly slight and feeble creatures have constantly to endure."

"How does the star-fish move?" said Walter; "I have been watching one in this pool of water for some minutes."

"You *mean* two or three," interposed Arthur.

"Well, two or three; and it seems to me quite incapable of going either up or down, backwards or forwards."

"In the first place, the rays or arms—whichever you like to call them—are movable, and can be used to assist the animal's progress;

in the second, it is far better provided with feet than you or I."

"Feet! *feet*! FEET!" shouted Walter, with a stare of incredulity, and a loud whistle; "come, Arthur, don't make fun of me."

"Not I, indeed. Let us turn this gentleman softly on his back.—Stranger from the deep ocean-waters, be assured we have no wish to injure you; we recognize the fact that you, like ourselves, were made by a divine hand.—There, he is lying comfortably on a bed of seaweed. Now, if you look closely, you will see along each ray a row of *ambulacra*, as they are called—"

"Am-bu-la-cra! That's Latin, and means something connected with walking."

"Some kinds of star-fish have two rows on each ray, and some two double rows. These *ambulacra*, or feet, are really small fleshy tubes, which thrust themselves through the animal's skin, or shell, the tube being closed at the extremity, and terminating in a sucker, usually in the form of a plate slightly sunken or depressed in the centre. To each tube, *inside* the animal, is attached a vesicle, or bladder, full of fluid;

and when the star-fish wishes to move it contracts this vesicle, and by so doing forces the fluid into the tube—just as by squeezing a bladder you can fill any pipe that may be fastened to it. The tube is then expanded and lengthened out ; but by means of its muscular fibres or threads it again contracts and shrinks itself up; and by alternately repeating these movements in all its feet, the animal advances. Of course its progress is very slow, but it is also very regular. If it meets with any impediment, such as a stone, it lifts one of its arms until it finds a point to cling to, then a second, and perhaps a third—just as by means of your hands and feet, putting forward first your left, and then your right, you climb up a wall or a rock.”

“That is very wonderful,” said Walter, reflectively.

“See, our gentleman stranger here is on the move ! He is tired of lying on his back. Do you observe how he thrusts forth his feet, and enlarges and retracts them—just like a blind man trying to feel his way ? Now he has got hold of the side of the rock. Look, he has turned himself over ! There goes one ray, now another,

now a third. Let us wish our friend a pleasant voyage round his pool, where he will stay; if he is wise, until the tide comes in."

"If he can *walk*," observed Walter, after a moment's pause, "I don't see how he can *eat*."

"He can eat and digest as well as you can."

"Why, I am sure he has no mouth!"

"Look at the dead one in my hand. Stay, here's a magnifying glass, which will enable you to see more clearly. Now turn it on its back, and in the centre of the disc, or body, you will note a kind of a rough fibrous circular space, with a small opening in the middle. That is the animal's mouth, which, in some species, is furnished with teeth, or what serve for teeth. The mouth opens into the stomach, which resembles a pouch or bag, and is divided into a couple of cells. In the one the food is transformed into a kind of paste before passing into the upper cell, which, by means of hollow pipes or tubes, communicates with the animal's rays; so that the very organs which assist it in its locomotion also assist it in its digestive processes."

"Who would have thought there was so much that is wonderful in a common-looking



object like this star-fish ! But what does it feed upon ? ”

“ All kinds of dead flesh, shell-fish, and even oysters. ”

Here Walter indulged in another whistle, put his hands in his pockets, shook his head, and looked the very picture of self-satisfied scepticism.

“ You seem inclined to doubt me, Walter, but I am only telling you what our greatest naturalists believe. And this is the way, according to Professor Rymer Jones, in which the star-fish sets to work : it seizes the oyster with its long arms, and by means of its suckers holds it right under its mouth ; then it inverts its stomach, and engulfs the oyster in its loose folds, like a boy with his head in a sack ; at the same time it drops a poisonous liquid on the edges of its victim’s shell, which forces it to open ; *hey presto !*—one gulp—and the oyster is gone ! ”

“ Whew ! ” cried Walter ; “ so the star-fish opens an oyster without an oyster-knife ! ”

“ The very remark made by a modern French writer,” said Arthur. “ But I have not told you half the wonders connected with, or ex-

hibited by, this curious little animal. For instance, if deprived of any one of its limbs, it possesses the power of replacing it—of creating a new limb. Never mind if it *does* lose an arm—a very common occurrence with a creature which the sea pitilessly dashes on the roughest rocks—it can immediately procure another, and not a *wooden* one. But more marvellous still, the star-fish frequently commits suicide.”

“Suicide! kills itself! oh! oh!”

“I mean what I say. The star-fish—or, more correctly speaking, two genera of it, called the *Ophrocoma* and *Luidia*—”

“Stop, Arthur; let me repeat those names. Opher—no—*Ophro-coma* and *Luidia*. I will try to remember them.”

“These genera possess the power of self-destruction, which they invariably exercise in their moods of terror or despair. If seized by the naturalist or fisherman, they break themselves up into small pieces, so that if you would preserve them, the only way is to kill them suddenly, by plunging them, the moment they are drawn from the sea, into a vessel of cold fresh water. I remember that Professor Forbes

gives an interesting account of his capture of one of these suicidal curiosities. He was then unaware of its self-destroying powers, and, therefore, spread it out in his boat to admire its form and colours. What was his horror, when he went to remove it for preservation, to find it dissolved into fragments! Next time our professor resolved not to be cheated, and carried with him a bucket of fresh water. Having brought up in his dredge a *Luidia*, the moment it reached the surface of the sea he carefully and anxiously plunged his bucket to a level with the dredge's mouth, and softly slipped the *Luidia* into the fresh water. Whether the cold was too much for it, or the appearance of the bucket too terrible, cannot be said; but in a moment it began to melt, and its limbs escaped through every mesh of the net. So that, you see, dear Walter,

‘There are more things in heaven and earth,  
Than are dreamt of in your philosophy.’”

“Well,” said Walter, musingly, “I *must* own that there are more things in natural history than I dreamt of. But now let us go ahead, Arthur; we shall have time to reach Foulness

Point. I wonder what that fisherman is carrying. What a quaint dress ! isn't it, Arthur ? ”

“ Quaint, but picturesque ; it *composes* well, as artists say, in a picture. Our fishermen are a fine hardy race, Walter, enduring privation with silent patience, and calmly confronting the wildest perils. They are a peculiar



FISHERMAN.

race, too, with manners and customs of their own ; somewhat rough in outward appearance, but with hearts as tender as a woman's. I never weary of conversing with them.”

“ I think I should like to go shark-fishing,” observed Walter.

“ Simply,” replied his cousin, “ because you don't know anything about it. What kind of shark-fishing would you like ? Would you imitate the African negroes, who plunge fearlessly into the water, closely watching the

monster's movements, and taking good care to keep ever above him? For his mouth being placed in the lower part of his head, he is forced to turn himself round before he can seize any object which is on a higher level. The negro waits till the monster makes this turn, and then rips up his belly with a sharp knife."

"No, no, Arthur; that would not suit me at all."

"It is true there is an easier mode; but I don't think it is very interesting. On a dark night a large hook is baited with a piece of lard or flesh, and a long and stout chain being attached to it, is flung overboard. Up comes the shark, looks at it suspiciously, feels all around it, sniffs at it, mistrusts it, and retires; but his appetite is too voracious for his prudence; after much coquetting, he pounces on the bait, and swallows it ravenously. Then he tries to sink in the water, but as the chain checks him, he struggles and plunges about until he grows exhausted, whereupon the chain is drawn up so as to raise his head above the surface. A cable is then thrown out with a running loop or knot, and dexterously twisted around the upper part

of his tail. No more remains to be done but to hoist him on deck, and despatch him with axe or harpoon."



SHARK-FISHING.

"Well, there would be some pleasure," remarked Walter, "in seeing the end of such a horrid monster. I hate sharks! I can't bear to read of their following our ships until some poor seaman is flung overboard, and his dead body drops into their ravenous jaws. And then, perhaps, when an unsuspecting sailor is bathing, one of these huge beasts will shoot through the quivering waters, and suddenly pounce upon

him ! Crash go his horrible teeth, and the sea, in a moment, is red with blood."

"The shark," observed Arthur Vernon, "is the dread of the pearl-fishers, lying in wait for them until they descend in quest of their plunder, then suddenly darting upon their unhappy victims. He is, indeed, a fierce and terrible creature, but, fortunately, he knows not his own strength."

"You speak of the pearl-fishers : how do they carry on their dangerous trade ?"

"In different parts of the world the pearl-fishery is differently conducted. In the Gulf of Manaar—a gulf on the north-east coast of the island of Ceylon—the boats go out at daybreak, each manned by twenty Singalese and a nêgro. The rowers are ten in number ; the other ten are divers. The latter divide themselves into two groups of five men each, who take alternate spells of rest and toil. They descend from forty to fifty, and even seventy feet, and remain for a period of thirty seconds."

"Only thirty seconds, or half a minute ! Why, Arthur, I could keep *my* head under water as long as that !"

“You forget the depth, Walter. If you just dip your head into the sea, you have no pressure to endure; but at seventy feet the weight is tremendous, almost crushing in the brain, and sometimes forcing the blood into the nose, eyes, and ears. You must also remember that the diver will repeat the operation ten or fifteen times in five or six hours.”

“What do these Singalese divers wear? A diving-dress, or helmet, like the man whom I saw at the Polytechnic Institution in London?”

“No, indeed, or they could remain longer than thirty seconds. They are perfectly naked, except a small belt of calico around their loins. In order to assist their descent, a large stone is attached to a rope; this stone weighs about fifty pounds, while the cord sustaining it frequently carries near its lower extremity a sort of stirrup to receive the diver's foot. When lowered from the boat, he places his right foot in this stirrup; in his left he holds the net which is intended to receive the oysters; then, grasping in his right hand a signal-cord to communicate with his comrades, and pressing his nostrils with his left, he dives down, down—



the cold green waters closing in around him like a pall."



PEARL FISHERS.

"But what *is* a pearl?" inquired Walter; "I think I have read that it is caused by a disease of the oyster."

“Such is the general opinion. It seems to be the result of the animal’s secretion, produced very frequently, if not always, by the pressure of some small foreign body in the centre—such as a grain of sand, the egg of a fish, or a rounded animalcule. The pearl at first is very small; but it increases annually, its lustre and colour depending on the nature of the substance which lines the shell—that white, glossy, flaky, radiant substance known as nacre, or mother-of-pearl.”

“Are there any pearl-oysters found on the English coast?”

“None of any importance. The principal localities are the Persian Gulf, on the Arabian coast, in Japan, in the American seas, on the shores of California, in the Bay of Bengal, and, especially, in the Indian Ocean. But, Walter, while *talking* we have been *walking*, and I have forgotten that I have letters to write for the next post. Let us retrace our steps, my boy, as quickly as may be, and to-morrow we will have another dip into natural history. So now for home.”



## CHAPTER II.

**W**ALTER and his cousin might have been seen, the next morning, perched on a ledge of rocks which jutted out from the shore, and engaged in the somewhat monotonous occupation of dropping pebbles into the water. Suddenly Arthur rose to his feet, and flinging abroad his arms with an oratorical air, began to recite, in a clear loud voice, Barry Cornwall's well-known address to the ocean :—

“ ‘ O thou vast ocean ! ever-sounding sea !  
Thou symbol of a drear immensity !  
Thou thing that windest round the solid world  
Like a huge animal, which, downward hurled  
From the black clouds, lies weltering and alone,  
Lashing and writhing till its strength be gone.’ ”

“ It does not lash and writhe *now*,” said Arthur, “ but dimples into smiles like the smooth cheek of a happy infant. But last Tuesday week, when a north-easter blew so furiously,

one would have owned the truth of the poet's comparison :—

‘Thy voice is like the thunder ; and thy sleep  
Is as a giant's slumber, calm and deep.’

“ It is asleep now, Walter ; and you can hear it murmuring in its dreams :—

‘Thou speakest in the east and in the west  
At once ; and on thy heavily laden breast  
Fleets come and go, and shapes that have no life  
Or motion, yet are moved and meet in strife.  
Oh, wonderful thou art, great element !  
And fearful in thy spleeny humours bent,  
And lovely in repose ; thy summer form  
Is beautiful ’—

Is it not, Walter ? Just look around you, and say :—

‘Is beautiful ; and when thy silver waves  
Make music in earth's dark and winding caves,  
I love to wander on thy pebbly beach,  
Marking the sunlight at the *morning* hour,  
And hearken to the thoughts thy waters teach—  
Eternity—eternity—and power.’ ”

“ Noble lines ! ” exclaimed Walter. “ Oh, is it not jolly to sit here on the rocks, with the blue waters rippling gently beneath our feet, while you repeat such splendid verses ? ”

“ The sea-shore is the place for poetry, Walter. If you want to enjoy a great poem, bring it down here, and read it to the music of

the waves. But come, youngster, it is your turn."

"I don't remember anything suitable, except 'A wet sheet and a flowing sea.'"

"Which isn't suitable," remarked Arthur; "for we are not on board ship, and there is not a breath of wind to fill our sails if we were. You were learning, a day or two ago, Byron's stanzas in '*Childe Harold*:' I don't think you will have forgotten them, for you are fond of poetry, and have a pretty good memory."

"Oh no; I remember them—at least, I believe so; but they are very long."

"Then oblige your audience with a specimen. We will be contented with a verse or two."

Walter accordingly began:—

" 'Roll on, thou deep and dark-blue ocean! roll!  
Ten thousand fleets sweep over thee in vain;  
Man marks the earth with ruin—his control  
Stops with the shore; upon the watery plain  
The wrecks are all thy deed, nor doth remain  
A shadow of man's ravage, save his own,  
When, for a moment, like a drop of rain,  
He sinks into thy depths with bubbling groan,  
Without a grave, unknelled, uncoffined, and unknown.

" 'Thou glorious mirror, where the Almighty's form  
Glasses itself in tempests; in all time,  
Calm or convulsed—in breeze, or gale, or storm—  
Icing the Pole, or in the torrid clime



A SCENE ON THE SEA-SHORE.

Dark-heaving ; boundless, endless, and sublime—  
The image of eternity—the throne  
Of the Invisible ; even from out thy slime  
The monsters of the deep are made ; each zone  
Obeys thee ; thou goest forth—dread, fathomless, alone.

“ And I have loved thee, Ocean ! and my joy  
Of youthful sports was on thy breast to be  
Borne, like thy bubbles, onward : from a boy  
I wantoned with thy breakers—they to me  
Were a delight ; and if the freshening sea  
Made them a terror—'twas a pleasing fear ;  
For I was as it were a child of thee,  
And trusted to thy billows far and near,  
And laid my hand upon thy mane—as I do here.’ ”

“ Very well recited, Walter,” said Arthur, clapping his hands. “ And bravo, Byron ! say I. There may be numerous errors both of taste and expression in these famous stanzas, yet, as a whole, how grand and impressive they are ! You seem to hear the roll of the ocean in every line ; you seem to catch an echo of its sublime music. It is evident that he who wrote them passionately loved the sea—loved to place his hand on its mane as on the neck of a favourite steed. Not like the Latin poets who, when they spoke of the ocean, always seemed afraid of it, and to regard it with dislike and suspicion. When Virgil went on a short voyage, what a fuss his friend Horace made about it !—calling

on all the gods to watch over the ship, and bring it back safe to port! In the French poets you will meet with something of the same half-revealed apprehension: they own its sublimity, but they like it best at a distance."

"What are these shells?" interrupted Walter, as he dug a number of dark-gray little excrescences from the surface of the rock; "limpets?"

"There," cried Arthur, laughing, "you have brought me down from the clouds at one 'fell swoop!' Yes, they are limpets; and that reminds me I promised you another lesson in natural history. Let us take these *limpets* for the subject of our opening remarks—hem!"

"I think we might choose something of greater interest."

"Not a bit of it. How often am I to tell you, Walter, that everything God has made is *full* of interest? Look at this limpet. Its Latin or scientific name, by the way, is *patella*, meaning a 'little plate'—to which, however, it does not bear much resemblance."

"No; it is more like a Chinaman's hat, or a dish-cover, or an expanded umbrella, or—"



"A limpet!" exclaimed Arthur; "spare me your comparisons. Well, its shell is called an *univalve*, because it is all in one piece, uniform and unbroken: an oyster is a *bivalve*, because it consists of two portions or valves, joined together by a hinge. In shape it is oval, non-spiral, but terminating, as you see, in an elliptic cone; that is, the point of the cone is not quite in the centre of the shell. Its sides are ornamented with ridges, which, if you notice, are arranged in the most perfect order, radiating from the summit like the spokes of a wheel; its edges are *dentate*, or cut up, as it were, into teeth. The interior is smooth, and brilliantly tinted."

"It seems to me," said Walter, who had been carefully examining one of the *patellæ*, "that the animal has no head."

Arthur handed his cousin his magnifying-glass, and bade him inspect it more narrowly.

"Oh yes, I see it now," cried Walter; "and it is furnished with a couple of horns—something like a snail's, only not so large."

"True; and at the external base of each, if you look closely, you will find an eye. The foot

is a sort of thick fleshy disc or knob, and provided with a mass of fibres, which it fastens to the rock, stone, piece of wood, or other object that affords it a resting-place. Its power of adhesion is remarkable, and has passed into a proverb: men speak of 'sticking as close as a limpet.' I have read that it can sustain without yielding a force of many pounds' weight. Try, now, to remove this gentleman here by my side with your hand. Pull—pull—pull! No use. Of course you can do it with your *knife*, because the blade destroys the fibres which cling to the rock."

"Do people eat limpets?" inquired Walter.

"Only, I think, when they can get nothing else; the flesh is neither very nutritious nor very digestible."

"Oh! oh! Arthur!" screamed Walter, suddenly; "something is biting me!"

"What have you been doing, boy? Thrusting your hand down into that crevice! Pull it out, and let me see what ails you. Why, you have been fishing for crabs without bait, and a good-sized individual has fastened upon your hand. Oh, we'll soon get rid of him; never fear!"

With his knife Arthur severed a couple of the creature's pincers, and released poor Walter—who was nearly fainting with fright and pain—from its tenacious grasp. He then jumped from rock to rock until he found a clear pool of water, in which he dipped his handkerchief, and quickly returning, he bathed his cousin's face and hands until he was completely restored.

"What a horrid monster!" exclaimed the poor boy. "I should not have cared, however, if I had known what it was."

"Let us avenge ourselves by making it serve as the text for our next lesson in natural history. Tie this piece of string to its hinder claw, and then you can keep your enemy constantly in sight.

"Crabs and lobsters, shrimps and prawns, all belong to the family of CRUSTACEANS—so called because clothed in a kind of armour, hard and strong, in some cases bristling with spines, and often almost impenetrable. Nearly all of them, too, are provided with formidable weapons of attack and defence, in the shape of strong stout claws, which, as you can prove from experience, are by no means agreeable to encounter.

“Most of the crustaceans frequent the sea-shore, living among the rocks, or hiding themselves under the sand; a few, however, inhabit the ‘deep, deep sea.’

“A remarkable peculiarity of these hard-shelled animals is, that at certain regular periods they voluntarily throw off their coats of armour. I daresay you have often noticed the empty shells cast up by the influx of the tide.”

“Of course I have, and wondered what all those empty shells could mean, and whether they were the result of some wholesale massacre of crabs.”

“Not so; it is a provision of Nature to admit of the creature’s growth. This solid calcareous shell is incapable of enlargement, and therefore it is *moulted*, or thrown off, at certain fixed periods. The crab then remains for awhile in a perfectly defenceless condition, and frequently falls a victim to other and more fortunate crabs, or to the various kinds of fish which prey upon the crustaceans. But, sensible of its weakness, it hides itself, if it can, in some obscure recess, until a new coat has been secreted, suitable to its enlarged proportions.

Then it issues forth again to lead its little life of battle and carnage."

"You say 'battle:' do they fight one another?"

"Ay; in this respect they resemble human-kind. They struggle in fierce contention like deadly enemies, and do not desist until one or other of the combatants has lost a tail, a foot, or a claw. This, however, is no great punishment; for, like the star-fish, the crustacean can replace its mutilated members: they reappear, in a perfect condition, after a few months' repose."

"That is really wonderful!"

"I have read," added Arthur, "that on the Spanish coast flourishes a species of crab whose claw is considered admirable eating. So the fishermen, after catching the unfortunate animal, cut off this dainty and return the crab to the sea—perhaps to catch it again when the limb has reappeared."

"That reminds me," observed Walter, "of an Abyssinian custom. When an Abyssinian peasant goes on a long journey he drives a bullock before him, cuts a steak from its back or sides when he needs it, and leaves the wound

to heal as best it may. 'Cut, and come again,' seems to be a favourite motto in Abyssinia."

"Did you ever see a crab eat a mussel? No? Well, it is curious to watch the crustacean's ingenuity. It keeps the two valves apart with one of its claws, while with the other it scoops out the fish, carrying morsel after morsel to its mouth very rapidly, and evidently with much enjoyment. Some kinds of crabs prey upon oysters. They wait until the bivalve opens its mouth to receive its food or absorb the rays of the sun, and then they slip in a stone, which prevents it from reclosing its valves. Of course, the imprudent mollusc is completely at their mercy."

"Who would have thought that a creature apparently so stolid and senseless would possess an instinct so remarkable?"

"A very singular anecdote is related by Professor Rymer Jones," continued Arthur. "He says that on one occasion he had introduced into his aquarium six crabs of different sizes. One of them, sidling forward to explore its new home, was encountered by another of somewhat larger proportions, which seized upon

it with its claws, broke open its shell, dug its pincers into its flesh, and commenced a luxurious banquet. Then came upon the scene a third and still stronger crab, which pounced upon the epicure just as *it* had pounced upon its weaker brother, pierced into its vitals in exactly the same manner, and gorged itself with the living food. Yet, curious to say, the victim never ceased from its repast for a moment, but continued to devour the first crab bit by bit, until it was itself literally torn to pieces by its conqueror."

"One can hardly believe such a thing to be possible. But don't some kinds of crabs take possession of shells that are not theirs?"

"You are thinking of the Hermit or Soldier crab (*Pagurus Bernhardus*), perhaps the most curious and interesting of all the crustaceans. It happens that the hermit crab, like some of our ships of war, is merely half-plated, having only its head and breast protected, while the rest of its body is exposed in a soft and yielding skin. Its instinct, therefore, induces it to look out for a suitable asylum—a shell as much like what its own *should* be as possible. If it finds

one empty, so much the better ; if not, he kills the original inhabitant, and takes possession by right of force ; living alone in his newly-acquired mansion until he becomes too big for it, and is compelled to set out in search of a new one. At ebb of tide you may watch him in his leisurely progress, turning and re-turning shell



HERMIT CRAB.

after shell, and even *trying* them, till he finds one to suit him—just as a man might try hat after hat before he felt quite comfortable. He is a very timid or very suspicious hermit, and at the least

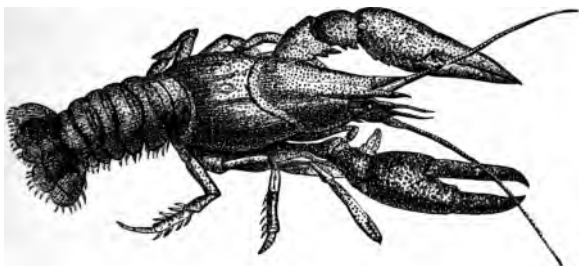


noise withdraws into his shell, closing up the entrance with his large hairy claws. Yet he is also very quarrelsome, and it seems almost impossible for two hermits to meet without fighting, or, at least, without *showing fight*. Each extends his long pincers, and seems to feel about for the other's vulnerable parts; but sometimes the two are so well matched that they 'agree to differ,' and, acknowledging discretion to be the better part of valour, pass on in peace. Occasionally, however, they really come to blows. Mr. Gosse saw a hermit crab attack another of his kind, who was much more conveniently and commodiously lodged than himself. He seized him by the head, dragged him from his shell, and taking prompt possession of it, left his victim to expire upon the sand."

"Of course lobsters, like crabs, belong to the crustaceans?" said Walter.

"Yes; but, as you know, they are much larger, and of a different shape and colour. In their habits they are very similar; and, like the crabs, they cast their shells. It is said that the young lobster *moults*—if I may use the expression—from eight to ten times in the first

year of its life, from five to seven times in the second year, from three to four times in the third, and two or three times in the fourth: in the fifth year they are full-grown. There is little doubt that after this the lobster casts its



THE LOBSTER.

shell annually, though no one seems able to explain how the operation is performed. Some writers assert that when it has moulted, or sloughed, the animal retires to a hiding-place, until it is again in a condition to contend with its numerous enemies. Others affirm that the process is one of absorption, since no cast-off coverings of adult lobsters are ever found. And others again contend that the shell comes off piecemeal, as it does in the cray-fish. But the puzzle is, how does the lobster release the

fleshy part of its claws from its defensive armour? I think we must believe, with the fishermen, that the animal 'pines,' or 'falls away,' like an invalid, before it casts its shell, and hence is enabled to withdraw its members from it. When a person grows thin through prolonged illness, his clothes become 'a world too wide,' as Shakspeare says, 'for his shrunk shanks,' and he throws them off with the greatest ease. This is the case, I imagine, with the lobster."

"To think," exclaimed Walter, "that I could call natural history *dull*, when it teaches us such interesting and instructive facts! Why, I could listen to you all day, Arthur!"

"And if I talked all day, I would not exhaust a tithe of the marvels of instinct, ingenuity, and adaptation of means to end which the naturalist finds revealed in the very humblest of God's creatures. You were frightened, I suppose, by the hard scientific names employed in zoological classification, which are useful enough in some respects, but in nowise concern your appreciation of the wonderful objects they are intended to particularize."

"How splendidly yonder fishing smack is driving through the waves!" cried Walter; "look how the white spray curdles about her bows!"

"A fine sight," said Arthur, "and one which always inspirits me; fills me with a sense of energy and power. But I see that a strong wind is coming up; heavy clouds are gathering in the west; and the sea—so smooth an hour ago—is now barred and streaked with lines of foam. What long rolling waves are pouring into the bay! And see how they leap and clamber up the rocks, as if they would rend them into atoms! Let us bend our steps homeward, Walter, for if a storm came on we should catch it here in all its violence."

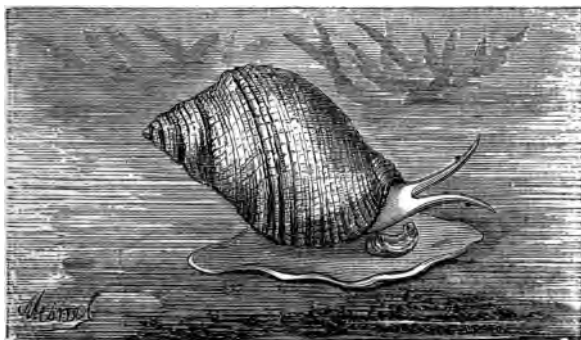
The two cousins accordingly descended from their rocky perch, and retraced their steps towards the town. As the tide was still on the ebb, they were able to keep along the shore, and at almost every step Walter found some object or other on which to found a question for his willing tutor. It is astonishing how much information may in this way be afforded and received; and I often regret that parents should



PREPARING TO MEET THE STORM.

almost entirely neglect a method of interesting and instructing their children whose efficacy has been so abundantly demonstrated.

Among other things which attracted attention was the mollusc popularly known as the waved whelk (*Buccinum undulatum*). Its shell is common enough on every part of our British



THE WHELK.

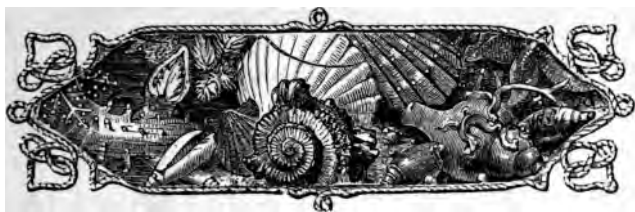
shores, and a familiar object on the street stalls of London. Its voracity is extraordinary; it attacks its neighbours with apparently unrelenting appetite, piercing through their shells, and extracting the juices of the fish within. Its mouth is furnished with a long, flexible, and movable proboscis, terminating in a spiny tongue, with which it drills and rasps

a hole in the hard calcareous covering of its victim.

Its shell is about four inches in length, and of a yellowish-white or pale-brown colour. In Scotland it is called the buckie.

Arthur also directed his cousin's attention to a kind of dark-green leathery bag, which might easily have been mistaken for a piece of seaweed, doubled, stitched at the side, but left open at either extremity to admit the sea-water. He told him it was known as the fairy purse, or the mermaid's purse, but was, in reality, the egg-case of some species of ray-fish or skate. About November, if one of those strange receptacles be cut open, the young fish may be found in its interior, fully formed, lying with its tail turned over its back, and waiting only for a little additional strength before it begins its career in the ocean-waters.

His mind intent upon these curious facts, Walter bade his cousin good morning, and hastened to communicate somewhat of his new-acquired lore to his mother.



### CHAPTER III.

**W**AMMA wants some specimens of seaweed, Arthur," said his cousin, when they met on the following morning ; " will you kindly help me to gather them ?"

" With pleasure, Walter. Let us keep across to the eastward, beyond Foulness Point, for among the rocks in that locality grow the very finest varieties. We must mind the tide, though ; for at high water the billows come tumbling and swirling up to the very cliff, and unless we were as nimble as chamois-goats or as monkeys, and could clamber up a great black wall as steep as the side of a house, and six times as high, we should be cut off to a certainty."

" Cut off ?" exclaimed Walter ; " what ! do you mean we should be drowned ?"

" Yes ; by the rising tide."



Walter's face looked blank at this assertion, and his cousin continued,—

“Last summer a narrow escape occurred in this very neighbourhood. A little girl and her brother, who had been playing about the shore in charge of their nurse, strayed away from her while she was engaged in gossiping with one of her own class, and wandered all along the beach as far as Foulness Point. Here they amused themselves very pleasantly—picking up shells, gathering sea-weed, and paddling in the rock-pools—until gradually driven further and further in towards the cliffs by the advancing tide. The boy was old enough to perceive, at last, that they must make an effort to return; and they got as far as yonder ledge of rocks, but beyond *that* their progress was stopped by the waters, which had gradually crept up to the very base of the cliff. What were they to do? The boy placed his little sister on the highest crag he could find—just out of reach of the waves—and seated himself below her; but as the tide continued to mount, he saw that in a few minutes they would be overwhelmed. Before them rose a low wall of rock, up whose steep

face it was impossible for them to climb unassisted."

"Oh, poor little creatures! I hope they were not drowned."

"You shall hear. Both the boy and his sister began to cry and shout as loudly as possible, and to wave their handkerchiefs, though hopeless of attracting any one's attention on so lonely a part of the coast. The water still mounted and mounted — slowly, slowly, but surely. How cold it was! How the poor children shuddered when it touched their feet! They said their prayers, from some undefinable belief that if *man* could not hear them *God* could and would, and send their parents to their rescue. Then they shouted again, and terror lent their voices so much strength that the very sea-birds seemed scared by their cries. At length, when the sea had risen up to the boy's waist, and all hope might well have been abandoned, his sister exclaimed, 'Charles, Charles, some one is coming down the cliff!' And so there was: carefully planting his feet on every tiny projection, and clinging with firm grasp to every tuft of grass, a brave

boy, who had heard their shouts and saw their danger, adventured the descent to the wave-washed rocks. He effected it in safety, and only just in time. Springing forward, he took the little girl upon his shoulders, and catching her brother by the hand, he waded through the waters, reached a higher ledge, and by patience and care contrived to place him and themselves in a tolerably secure position, where they waited until the tide went down. Then he took them home to their parents, whose alarm and anxiety had been excessive, and who rewarded the saviour of their children with befitting liberality."

"How glad I am they were saved!" cried Walter. "How awful the boy and his sister must have felt on that lonely rock, with the waters gradually creeping higher and higher about them!"

"Yes; and their escape," said Arthur, "was really almost miraculous. Well: this anecdote will show you the necessity of caution in such a locality; but the tide, I believe, is running out, so that *we* shall be in no danger, unless we spend more hours upon our task

than will be at all necessary. But here we are."

At this point the shore may best be described as a mass of broken rocks, separated from the cliff by a narrow strip of shining, shelly sand; rocks of all sizes and shapes, angular and rounded, great and small; some reared upright like towers and spires, others lying horizontally, or propped up against one another; some thickly matted with tangle and bladder-weed, others all bare and naked in the sun: here a narrow creek of sea-water insinuating itself into the very heart of the rocky chaos; and there a delicious pool, fringed with lovely plants, sleeping tranquilly in a shady hollow.

Than these rock-pools, these miniature sea-lakes, these fairy-basins, I can conceive of nothing more surpassingly beautiful. In their transparent depths lie all manner of graceful and radiant things, rendered lovelier still by the wavy half-delusive medium through which we view them. If you would see in narrow compass the most impressive manifestations of the wisdom and power and infinite creative wealth of Him who made the worlds and set in motion

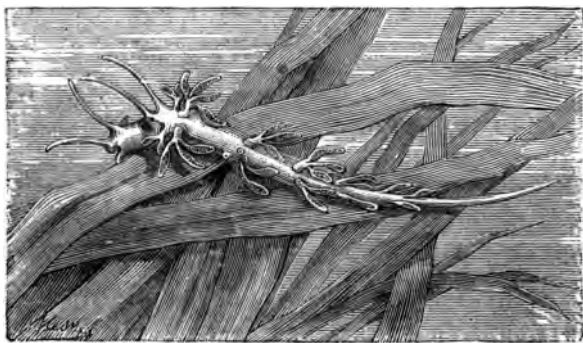
the universe, go you down to the shore, and study the teeming basins hollowed in the living rock. There shall you see strange quaint shells and animals ; little " shrubberies of pink coral-line ;" crimson leaves waving like knightly banners ; purple tufts of fibre as soft and sleek as silken thread ; fan-shaped fronds, reflecting a glow of luminous azure, " like that of a tempered sword-blade ;" and tiny forests of feathery weeds, like the plumes of kings. There, too, shall you see, as the poet saw,

" Living flowers,  
Which, like a bud compact,  
Their purple cups contract ;  
And now in open blossom spread,  
Stretch, like green anthers, many a seeking head.  
And arborets of jointed stone are there,  
And plants of fibres fine as silkworm's thread ;  
Yes, beautiful as mermaid's golden hair  
Upon the waves disspread.  
Others that, like the broad banana growing,  
Raise their long wrinkled leaves of purple hue,  
Like streamers wide outflowing."

I can promise you that Walter and his cousin were wonderfully delighted by these ocean-gardens, and found in them a source of the purest and wholesomest enjoyment. Arthur had so much to tell, and Walter so much to

learn! Arthur had to tell, and Walter to learn, about the *Laminariæ*, with their numerous branching roots and rugged stems; the *Nereocysts*, with taper wands, sometimes seventy feet in length, and terminating in an enormous bladder, like a club; and the beautiful *Chondrus crispus*, or Carrageen moss, which hangs its purple-brown fringe around the edge of many a silent pool. Arthur had to tell, and Walter to learn, how this moss, when boiled, yields a peculiarly nourishing and delicious jelly, of great benefit to invalids; and how, on many parts of the British coast, the graceful feathery *Dulse* is stewed and eaten as a vegetable. Arthur had to tell, and Walter to learn, how to distinguish the long thick stalks of the larger species of *Tangles*, and the olive-coloured *Bladder fucus*, or *Bladder wrack*, whose numerous little air-filled cells explode under the passing foot like a score of crackers. Arthur also told his cousin of marvellous weeds floating far away in warm tropic waters; of the *Macrocystis pyrifera* (forgive the "hard name," O reader!), which is five to fifteen hundred feet in length, and forms so thick a belt that no swimmer,

however bold and skilful, can force a passage through it. He told him also of the Sargasso weed—the *Fucus natans*—which covers a wide area of the Atlantic Ocean—forty thousand square miles, at least—and is of a delicate yellowish-green, with narrow fronds. He told him also of the *Chorda filiense*, or whip-lash, whose numerous threads and slippery filaments often entangle themselves about the bather and imperil his safety. He bade him collect, among his specimens, some long pieces of the ribbon-



SEA-WEED.

like sea-girdle, or sea-hanger (*Laminaria digitata*), which serves as a tolerable weather-glass—always growing damp before the approach of rain. Then he showed him the *Sea-furbelow*,

with its bulbous, tulip-like stem, and its fronds, which, if spread out, will cover a circle of six-



SEA-WEED.

and-thirty feet. Nor did he forget to remind him that nearly all kinds of sea-weed contain the chemical principle called *Iodine*, which has been found of so much benefit in many painful diseases; that some species are edible; that others are useful for manure; while others, again, afford protection to a world of tiny lives.

But there are things still more curious to be discerned by the keen observant eye. Under every stone, in every corner, on every bit of rock, lurk wonders all undreamed of by the ignorant. Plants and animals of numberless varieties and widely different characters—from



the ridiculous to the sublime, from the hideous to the beautiful—yet all bearing a distinct impress of the Divine Intelligence that for its own mysterious purposes created them. Let me give you one scene which Walter and his cousin saw, and let me give it in Mr. Kingsley's graphic words, premising that similar scenes are occurring every minute on the "weedy shore."

Turning up yonder stone, we find an animal as foul and monstrous to the eye as "hydra, gorgon, or chimæra dire," and yet so wondrously fitted to its work, that we must needs endure for our own instruction to handle and to look at it. You see it? That black, shiny, knotted lump among the gravel—small enough to be taken up in a dessert spoon. Look now, as it is raised and its coils are drawn out. Three feet—six—nine, at least, with a capability of seemingly endless expansion; a shiny tape of living caoutchouc, some eighth of an inch in diameter, a dark chocolate-black, with paler longitudinal lines. Is it alive? It hangs helpless and motionless—a mere velvet string across the hand. Ask the neighbouring annelids

(worms) and the fry of the rock fishes, or put it into a vase at home and see.

It lies motionless, trailing itself among the gravel ; you cannot tell where it begins or ends ; it may be a dead strip of sea-weed, or even a tarred string. So thinks the little fish who plays over and over it, till he touches at last what is too surely *a head*. In an instant a bell-shaped sucker mouth has fastened to his side, and in another instant a concave double proboscis, like a tapir's, has seized him as your finger closes round a stick. And now begins the struggle ; but in vain. Our worm is playing his fish with such a "line" as human angler never handled—a living line, more elastic than the most delicate fly-rod, which follows every lunge, shortening and lengthening, slipping and twining round every piece of gravel and stem of sea-weed, with a tiring drag such as no Highland wrist or step could ever bring to bear on salmon or trout. The victim is tired now ; and slowly, and yet dexterously, his blind assailant feels and shifts along his side, till he reaches one end of him ; and then the black lips expand, and slowly and surely the curved proboscis

begins packing him end-foremost down into the gullet, where he sinks, inch by inch, till the swelling which marks his place is lost among the coils, and he is probably macerated to a pulp long before he has reached the opposite extremity of his cave of doom. Once safe down, the black murderer slowly contracts again into a knotted heap, and lies, like a boa with a stag inside him, motionless and blest.

Having examined with eager interest these and other curiosities, and collected an exquisite bouquet of *fuci*, and *algæ*, and *laminariæ*, Walter and his cousin began their retreat from the shore, as the tide had turned, and with slow but irresistible advance was marching inland. Picking up a shell which lay at his feet, Walter inquired its name.

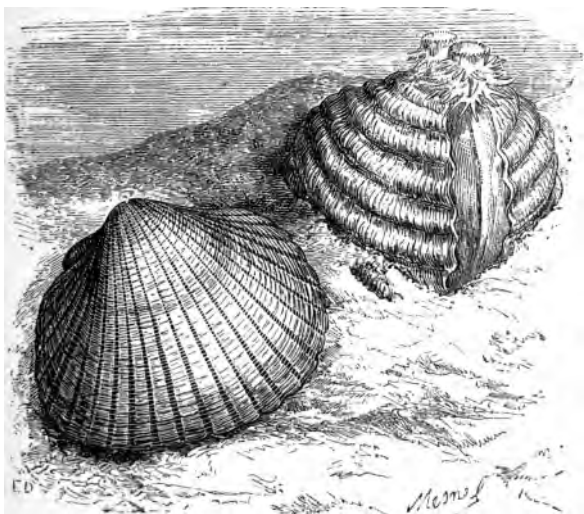
"That," said his cousin, "is a *Cardium*, or *Cockle*. The species are very common along our British coasts. They are bivalves, with convex shells, and are called cardiums from their supposed resemblance to a heart. What is the Latin for 'heart,' Walter?"

"*Cor*."

"And the Greek?"

“*Kardia* (καρδία).”

“Then you see it is named from the Greek word for ‘heart.’ Here is another specimen, with the fish inside it. Do you see what a large foot it has, with a sort of bend or instep



COCKLES.

almost in the middle? And here observe the two tubes by means of which it breathes and obtains its food; for you must remember that the cockle generally lives three or four inches deep in the sand, and would die but for these tubes, which it projects above the surface.”

"If they lie interred under the sand, how do you find them out?"

"By the tiny spirts of water which they eject from these same tubes. The cockle, let me tell you, is a very remarkable individual, and his movements, in their gracefulness and agility, would do credit to any dancing-master. Sit down here for a minute or two, and I will read you something about them from a book I have in my pocket—Mr. Gosse's *Aquarium*. He refers to the great cockle, *Cardium tuberculatum*—a cockle with warts or knobs upon its shell—found chiefly on the warm southern shore of Devon."

"Read on, Arthur," said Walter, "and I will listen with all my might."

"Mr. Gosse had deposited some of these cockles in a dry dish, knowing that they are not unaccustomed to an occasional exposure to the air. 'By-and-by,' he says, 'as we were quietly reading, our attention was attracted to the table where the dish was placed by a rattling uproar, as if flint stones were rolling one over the other about the dish. *Oh, look at the cockles!*' was the exclamation; and they were, indeed,

displaying their agility and their beauty, too, in fine style. The valves of the largest were gaping to the extent of three-quarters of an inch; but the intermediate space was filled up by the spongy-looking fleshy mantle, of a semi-pellucid orange hue. At one end protruded the siphons—two thick short tubes, soldered, as it were, into one, and enveloped on all sides in a shaggy fringe of *cirri*, or tentacles. The circular orifices of these tubes—small holes, perfectly round, with a white border—had a curious appearance, as we looked at the heart-shaped end of the valves. The discharging orifices, however, were but rarely visible, being usually closed, while the others remained constantly open. But these things were what we afterwards saw. For some time we could look at nothing but the magnificent foot, and the curious manner in which it was used.

“‘The two lips of the mantle’—I am still reading from Mr. Gosse—‘the two lips of the mantle suddenly separate, and gaping widely all along the front, recede nearly to the valves; while at the same moment a huge organ is

thrust out, somewhat like a tongue, nearly cylindrical—' ”

“Cylindrical ! ” exclaimed Walter ; “ oh, that means shaped like a cylinder—like my lead pencil, or an engine-boiler ! ”

“ True, ” said Arthur, laughing at his cousin’s strange comparisons, —“ ‘ nearly cylindrical, but a little flattened, and tapering to a point. Its surface is smooth, and brilliantly glossy, and its colour a fine rich scarlet, approaching to orange ; but a better idea of it than can be conveyed by any description will be obtained by supposing it to be made of polished cornelian.

“ ‘ This beautiful and versatile foot is suddenly thrust out sideways, to the distance of four inches from the shell ; then its point being curved backwards, the animal pushes it strongly against any opposing object, by the resistance of which the whole animal, shell and all, makes a considerable step forwards. If the cockle were on its native sands, the leaps thus made would doubtless be more precise in their direction, and much more effective ; but cooped up with its fellows in a deep dish, all these herculean efforts availed only to knock the massive

shells against the sides, or roll them irregularly over each other.' "

"So much for Mr. Cardium," said Walter; "I shall always look upon him henceforth with a great deal of respect."

"And now let us hasten home, for the tide is coming in both 'fast and furious.' See, it has already reached the rocky point below the lighthouse, and with its clashing clanging roar seems to have startled the sea-birds into action."

"Yes; what a cloud of white and black wings is hanging about the cliff! What birds are those, Arthur?"

"Gannets, and guillemots, and gulls; you may distinguish the latter by their snowy pinions. These birds love to breed on the ledges and projecting points of the cliff, and men let themselves down by ropes to gather their eggs."

"I should like to pay a visit to yonder lighthouse, Arthur, and see the great lamp which burns at night with so bright a glow. How the sailors must rejoice when they come in view of the well-known flame! But I have often wondered in what manner they distinguish one from another."



**THE LIGHTHOUSE.**

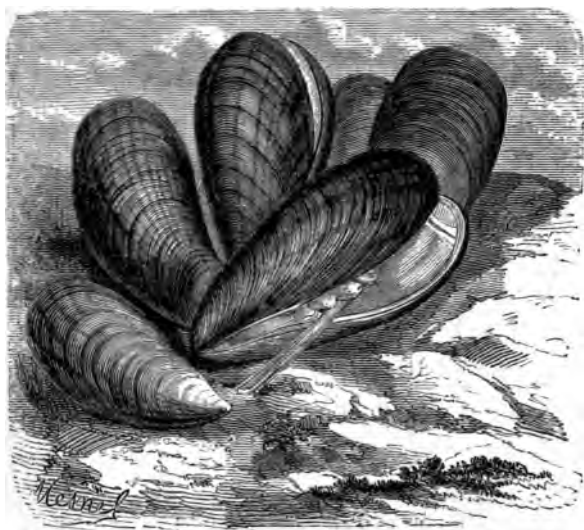
“Why, some are revolving lights—that is, they turn round once or twice a minute; others are fixed; others intermittent; some are double, some single; some red, others white; and all these differences are marked down in the charts by which the seaman guides his vessel on her watery way.”

By this time they had clambered over the rocks, and gained a stretch of smooth, firm, yellow sand, where the waters no longer came up with a rush and a roar, but glided over the sloping beach, like waves of light along a green hill-side. There was no further fear of being overtaken by the tide, for the sand curved inland to a considerable distance, with a gradual rise, and even at high water the sea never completely covered it. Looking out upon the bright emerald billows, with their ridges of pearly foam, and rejoicing in the warm glow of the sunshine that fell all about and around, Arthur could not subdue his emotion, and burst out with a verse of Tennyson's beautiful lyric:—

“ Break, break, break,  
On thy cold gray stones, O Sea!  
And I would that my tongue could utter  
The thoughts that arise in me.”

Walter intimated his approval of his cousin's musical display by clapping his hands; but he would not allow him to begin another song. His new-born taste for natural history was so keen, that no amount of information seemed able to satisfy it, and every object he saw suggested fresh questions. Arthur was by no

means indisposed to answer them; and on some mussel-shells which his cousin picked up he delivered a lecture that lasted all the way home.



MUSSELS.

“The mussel,” said Arthur—“the mussel, as you see, is a bivalve, and also equivalve—that is, its two shells are both of the same size; it is longitudinal, or longer than it is broad; it is pointed at the base, and is able to attach itself to any object by means of a *byssus*, or beard; and it has a foot, which, from its power of ex-

tending itself, might almost be called a tongue. It has a heart, and a liver, and a stomach—is, in fact, very well provided with internal organs; but on these I need not enlarge.

“At the base of the foot, Walter, lies a gland which furnishes a kind of gluey matter; and this gluey matter, or thick liquid, is moulded into a thread in the groove of the foot. Thread upon thread forms the byssus, or beard, by which the mussel clings to its resting-place, and by which also it moves from one point to another. For the mussel is luckier than the oyster, and can change its residence at will. I admit that its progress is very slow—half an inch, perhaps, at a time; but then it has not the same need of rapid movement that man has, and though slow it is sure. It seems to act upon the old maxim—‘More haste, worse speed.’”

“But how does the mussel contrive to move? To look at it, you would think,” said Walter, “that a more helpless creature never existed.”

“Look at this post. Now, suppose the mussel has fastened its byssus here; it draws upon it, as upon a rope, and the shell is displaced, the house is in motion, away goes the

mussel! But again it stops, stretches out its foot, and hooks to the post a fresh hair of its byssus; then, by withdrawing its foot suddenly, and hauling on to its thread, it accomplishes another forward movement. Each time that it repeats this operation it seems to attach an additional hair, so that at the close of four-and-twenty hours it has used several inches of cordage. As many as a hundred and fifty of these small threads are found in the byssus of some kinds of mussels, by whose means they anchor themselves securely to the rock.

"But here we are in sight of home. Tomorrow—"

"Oh, stop a moment, Arthur," interrupted his cousin; "do tell me to what kind of fish this straight thin shell belongs. I declare it looks uncommonly like an old razor-handle!"

"And for that very reason," replied Arthur, "it is popularly called the *Razor-fish*, and sometimes the *Sword-fish*. Its scientific name is *Solen*. Its peculiar shell, which is open at both extremities, renders it easily recognizable. It lies buried vertically in the sand, at a short distance from the shore. Its hole—which

after once excavating it never quits—is frequently two yards deep, so that it lies therein tolerably secure from the attacks of any enemy but man.”

“ But how does it get up to the top of its hole to breathe, or obtain its food ? ”

“ Why, it has a large conical foot, bulging in the middle and pointed at its extremity, and by means of this appendage it easily raises itself to the entrance of its burrow. On the least alarm it buries itself with extraordinary rapidity, so that you might almost as well attempt to catch an eel with your fingers.”

“ If that is the case, how do the fishermen catch it ? ”

“ When the sea retires, they detect the hiding-place of the solen by a small aperture in the sand, whence every now and then little bubbles of air escape. To attract it to the surface, the fisherman drops into the hole a pinch of salt ; and the moment the animal presents the point of its shell above the sand, it finds itself in a grasp from which there is no escape.”

“ I have seen a piece of stone bored all over

with little holes. Are these made by a fish ? ”

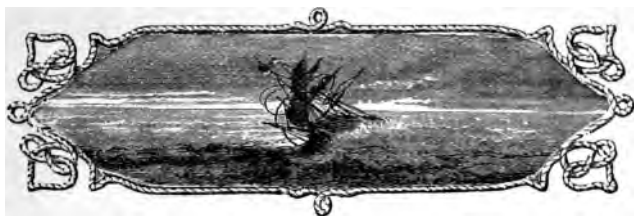
“ Yes ; by fishes of the genus *Pholas*, provided with thin, transparent, equivalve shells, the fore-part of which is armed with a number of little stony points, like a steel rasp. The fish clings to the rock with its foot, and then turns from side to side, working its rasp, until it has made a hole large enough to receive it. You will frequently find a post that has been for any length of time under water completely honeycombed by these wonderful little creatures.”

“ How much I have yet to learn ! ” cried Walter ; “ and how interesting it all is ! ”


“ Well ; let us go on learning and observing, day after day, since the toil is so admirably repaid by the pleasure it affords. And now, my boy, good morning. To-morrow my new boat will be ready ; and if your mamma will allow of it, we will try her under sail.”

“ Oh, that will be famous ! Hurrah ! hurrah ! ”





#### CHAPTER IV.

 "NOW, Walter," said his cousin, as, next day, he took his seat in the stern of the boat, with his hand upon the tiller, and prepared to keep her well "up to the wind,"—"now, Walter, your favourite song would be appropriate:—

‘ A wet sheet and a flowing sea,  
A wind that follows fast,  
And fills the white and rustling sail,  
And bends the gallant mast ! ’ ”

“ It is just a favourite of mine because mamma says it was a favourite of my father’s. What is ‘ a wet sheet,’ though ? ”

“ I suppose the poet meant the sail wetted by the spray ; or, you know, in certain cases, sailors wet the canvas purposely, in order that it may more effectually catch the wind.”

“ How can that be ? ”

“ The water closes up the pores of the sail,



and renders it more capable of resisting the passage of the air. Hold up your handkerchief to the wind. Now dip it into the water, and hold it up again."

"Oh, I see. Its surface is stiffer now, and the wind seems to blow harder against it. Well, but is not this *jolly*?"

"It is, indeed, what you call *jolly*, but you must keep your seat, Walter. Never move about, except when requested by the boatman, in a small boat under sail. An incautious movement has upset many a craft, and caused the death of hundreds. But, as you say, this is *jolly*, delightful, magnificent! There is something very agreeable in swift, easy, and gliding motion; it carries with it such a sense of power. And then, too, the day is so lovely! Such a blue sky—look at it, Walter!—blue as any sapphire ever dug out of the bowels of the earth, and yet dappled all over with masses of vapour which the sunlight converts into snowy clouds. Is it not wonderful to think that those fleecy pavilions—those celestial æry palaces—those snow-white tents of angels—which seem so exquisitely pure and luminous, are just built

up of the gases and exhalations which are thrown off the surface of the earth? Drawn up by the sun, they congregate in the upper air, and gather together into strange and beautiful forms, and are wafted hither and thither by the winds, until they grow too heavy to be any longer supported by the atmosphere, and once more descend to this lower world in the shape of rain, or mist, or hail, or snow. And having thus descended, they are again exhaled from earth, and again drawn up into the firmament; and so the marvellous exchange goes on—day after day, night after night—fertilizing, enriching, and blessing!”

“There is a great white bank of clouds yonder, Arthur, which looks exactly like a range of snow-crowned mountains.”

“And another just above it reminds one of the plumed helmet of a knight.”

“And here, nearly over our heads, sprawls a tremendous dragon, Arthur. Don’t you see its long coiling tail?”

“Yes; and its huge head, with half-open jaws. It recalls the lines of our poet Shakespeare:—

' Sometimes we see a cloud that's dragonish ;  
A vapour, sometime, like a bear or lion,  
A towered citadel, or pendent rock,  
A forkèd mountain, or blue promontory,  
With trees upon't that nod unto the world,  
And mock our eyes with air.' "

" Oh, dear me ! " sighed Walter ; " how *much*, how *very much*, you know, Arthur. I wonder whether I shall ever know *half* as much ! "

" Unfortunately," replied Arthur, " you are quite mistaken, cousin mine. I know very little ; only just enough to know that I know nothing. You have heard of the great Sir Isaac Newton, who made such remarkable discoveries in the world of science ? "

" Oh, yes. He found out the law of gravitation, did he not ? The law which keeps the planets in their courses, and us upon our feet."

" Well, what think you was said by this truly great man of all his wonderful achievements ? ' I do not know what I may appear to the world ; but to myself I seem to have been only like a boy playing on the sea-shore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered

before me.' Stop, I can give you Newton's saying in the versified form in which Byron has put it:—

‘ Newton (that proverb of the mind), alas!  
Declared, with all his grand discoveries recent,  
That he himself felt only “ like a youth  
Picking up shells by the great ocean—Truth!” ’

Let not that discourage you, however. It is better to pick up the shells than, like the idle and ignorant, tread them under foot.”

“ Thanks to you, Arthur, I have picked up one or two since I have been down at the sea-side. At least, I know many things which I did not know before.”

“ Acquire but *one* fact every day in the year, and you will have gained three hundred and sixty-five by the end of the twelvemonth. And more than that, for each single fact is the key to at least ten other facts. The secret is just this—never to let an opportunity of acquiring knowledge pass by you unheeded. When Luther was translating the Bible into German, what do you think was his motto? ”

“ I cannot guess, Arthur.”

“ It was short and sweet, brief and pithy :  
*Nulla dies sine linea.*”

"*Nulla dies*—oh, that means, 'No day without doing a line.' Capital, capital!"

"I believe," added Arthur, "the proverb arose from the practice of the famous Greek painter Apelles, never to spend a day without working at the art in which he acquired so extraordinary a proficiency. Hold this rope a minute, Walter; though the wind is fresh we may venture to let out a little more canvas. There, that will do."

"We are cutting through the water," said Walter, admiringly, "like an eagle through the air!"

"Ay; but we shall not go back so fast, for the wind will be dead against us, and we shall be forced to tack about—to go from side to side, I mean—which is always a slow process. What a romantic part of the coast is this, Walter! Look at the long line of dark rugged cliffs, and the shore beneath them dotted with red-capped fishermen."

"Yes; and do you see the old boat turned upside down on a ridge of stones, so as to form a kind of hut? What a comical habitation! I say, Arthur, isn't it nice to dip your hand in



FISHERMEN ON THE BEACH.

the water as it ripples by? But what a greasy feeling it has!"

"That is due to the animalcules which it contains: every drop of water is a world of life."

"Oh, look, look! here is a beautiful creature! Just like a lump of transparent jelly!"

"That is a Medusa—one of what zoologists call the *Actinia calepha*, and fishermen, Sea-jellies."

"There, I have it—no—I have got it now—no—it has slipped through my fingers."

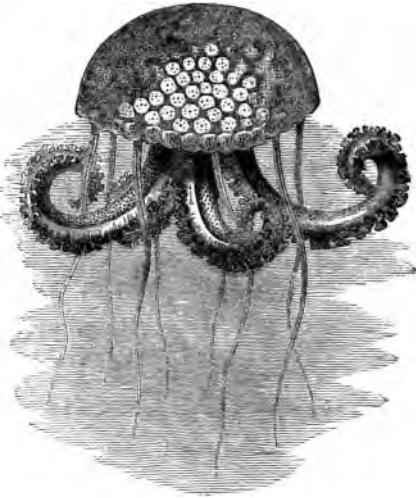
"Take the tin can lying under the seat, and when you see another, pop it underneath, and draw up water and all. Mind, though, don't over-balance yourself. And now I think of it, you had better sit on the other side."

"Here comes a gentleman, all over radiant colours! Now, then!—I've got him, Arthur!"

"Very well; sit still while I make a tack to southward. Then we'll bring round the boat, and bear down for home. All right, Walter. Now we will have a chat about the Medusæ."

"I have frequently found these jelly-looking substances on the rocks, Arthur, but I never knew they were living fish."

“Lying like lumps of blubber on the shore, they are not very attractive ; but when seen floating in their natural element, they wear a very different aspect. Such is the difference, you see, between a thing in its place and



MEDUSA.

a thing out of its place. But because you meet with them wrecked upon the rocks, you must not conclude that they are dead. Let me read to you a passage from an eloquent French writer : Often, he says, have these poor castaways arrested my attention. They are small, he continues—scarcely larger than my hand—but remarkably beautiful, with their soft subdued shades, or opal white. One of these delicate creatures I found overturned by the wind, its crown of lilac hair floating upward,



and its circular disc-like body prostrate underneath. The exquisite creature, with its visible innocence and glowing rainbow-like colours, was stranded, like a gliding, trembling jelly. Nevertheless, I paused beside it. I slipped my hand underneath it, raising the motionless body with the utmost caution, and restoring it to its natural position for swimming. On my placing it in the neighbouring water, it sank to the bottom without giving a sign of life. I pursued my walk along the shore, but at the expiration of ten minutes returned to my medusa. It was undulating beneath the breath of the wind. It swam to and fro with peculiarly graceful movement, its wavy tresses flying round it as it swam. By degrees it retired from the rock, and soon it was far away in the distance."

"Do you always carry a book in your pocket, Arthur?"

"Generally. I am somewhat of a bookworm, you know."

"What is the name of the book you have just been reading from?"

"*La Mer*—'The Sea'—by an eloquent French writer, named Michelet. A better sea-

side book you could not wish for. But I will put aside my precious little volume, and tell you some facts about the medusæ. In the first place, I suppose they are the *least solid of all animals*; their bodies are, indeed, composed of little else than water enclosed in a kind of invisible net. Hold one in your hand, and the heat will quickly dissolve it into water. I have heard that a medusa weighing fifty ounces will yield only five or six grains of skin. From individuals of twelve pounds weight, only six to seven pennyweights of solid matter is procurable. Fancy a sirloin of beef affording scarcely half an ounce of substance!"

"Are all medusæ of this circular shape?"

"Yes; and when floating on the surface of the wave they have therefore been compared to a bell, an umbrella, or a mushroom. The latter object they do in truth very closely resemble, if we suppose the *stool* or body of the mushroom to have been divided into more or less divergent, twisted, shrivelled, and fringed lobes, or folds, with the edges delicately cut, and the whole provided with long thread-like appendages, descending vertically into the blue

water like the drooping branches of the weeping willow."

"This medusa is of a pale rose. Are they all alike in colour?"



MEDUSA.

"No ; some are blue as the summerheavens; others, red as vermillion ; not a few resemble the violet of the woods ; and many seem to be streaked with different shades and dyes. Frail as they are, they make long voy-

ages on the surface of the waves. They move slowly, but unceasingly. Their movement is effected by alternately contracting and expanding their jelly-like body, which causes a certain amount of water to be ejected with more or less force, and so propels them onward in the opposite direction. In the same manner

they contrive to rise to the surface. To sink, they have simply to remain quiet; their weight is of itself sufficient to make them descend. This twofold operation of expansion and contraction resembles the action of breathing in the human chest, and hence the ancients were induced to give the medusa the quaint name of *Sea-lungs*."

"This is very interesting, Arthur. But surely this lump of radiant jelly is not actually an animal—has no mouth, for instance?"

"It *has* a mouth, I can assure you; but where do you think it is placed? In the middle of its neck!"

"And what does it feed upon?"

"On small shell-fish, sea-worms, molluscs. It is very voracious, and swallows its victim at a mouthful, without taking the trouble to divide it. If the victim offers any resistance, the medusa simply holds on until it has completely exhausted itself by its fruitless struggles."

"I think you used another name than medusæ for these strange animals—acal, acal—"

"*Acalephæ*, or Sea-nettles."

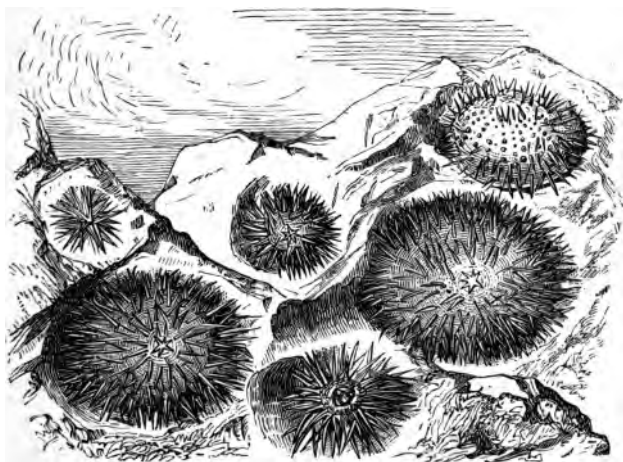
“Sea-nettles ! what a curious term ! Nettles sting.”

“And so do these medusæ, if you come in contact with them. And the pain which the larger individuals cause is described as very severe. Some of them are of considerable dimensions—upwards of a yard in diameter ! There is a medusa found on our coast in warm calm weather called the *Plizostoma Aldrovandi*—excuse the hard names, Walter—which, if it touches a bather or a fisherman, inflames the skin and raises it up in scarlet pustules.—Halloa ! here is a piece of timber floating by ! Let me get hold of it.”

In a minute Arthur had hauled it into the boat, where he let it lie at the bottom. But Walter could not rest satisfied until he had given it a thorough overhaul, in the course of which he discovered what is called a *Sea-urchin* clinging to it. This afforded the two cousins another subject of conversation, and pleasantly occupied them during their repeated tacks ; a mode of progression which to a landsman is always very wearisome.

The sea-urchin, or sea-hedgehog (*Echinus*)

is assuredly a curious animal. It consists of a kind of central and nearly spherical cell, bristling all over with prickles. Its body is globular in form, but rather oval than circular, and, owing to its extreme fragility, would soon be



SEA-URCHINS.

destroyed, but for the protection afforded by its spiny coat. Its spines, or tentacula, or bristles not only serve as a defence, but are its organs of locomotion. They are hollow internally, and put in motion by numerous ingeniously adapted muscles. When filled with liquid, they necessarily become inflated, and in such a manner

that at the will of their owner they adhere, by means of their terminal suckers, to any object he chooses. Let us imagine one of these creatures to be lying at rest, with all its spines motionless, and its filaments reposing within its shell. Some of them involuntarily escape, extend themselves, and feel the ground about them; others follow; but the sea-urchin still remains quiescent. If he wishes to change his position, the anterior filaments contract themselves, while the hinder ones release their grasp, then the shell moves forward.

A remarkable feature in connection with the sea-urchin has been described by Mr. Gosse:—

“A globular hollow box has to be made,” he says, “of some three inches in diameter, whose walls shall be scarcely thicker than a wafer, formed of unyielding limestone, yet fitted to hold the soft tender parts of an animal which quite fills the cavity at all ages. But in infancy the animal is not so big as a pea, and it has to attain its adult dimensions. The box is never to be cast off or renewed; the same box must hold the infant and veteran urchin. The lime-

stone can only increase in size by being deposited. Now the vascular tissues are within, and the particles they deposit must be on the interior walls. To thicken the walls from within leaves less room in the cavity ; but what is wanted is *more* room, even more and more. The growing animal feels its tissues swelling day by day by the assimilation of food. Its cry is, 'Give me space ! a larger house, or I die !' How is this problem solved ? Oh, there is no difficulty. The inexhaustible wisdom of the Creator has a beautiful contrivance for the emergency. The box is not made in one piece, nor in two, nor a hundred. *Six hundred distinct pieces go to make up the hollow case*, all accurately fitted together, so that the perfect symmetry of the outline remains unbroken ; and yet, thin as their substance is, they retain their relative positions with unchanging exactness, and the slight brittle box retains all requisite strength and firmness, for each of these pieces is enveloped by a layer of flesh ; a vascular tissue passes up between the joints, where one meets another, and spreads itself over the whole exterior surface."



And it is in this way, by this process of gradual enlargement, the sea-urchin grows.

The number of spines, or prickles, which it can boast of is extraordinary ; more than twelve hundred have been counted upon a single shell, or, if we include the smaller and later bristles, the total will not be less than three thousand ! And then its mouth ! This is awful, preposterous, immense—a huge, all-devouring mouth—a perfect cavern—situated underneath the creature's body, armed with five sharp and vigorous teeth, and incessantly opening and shutting, as if rest were impossible to it.

But these sharp teeth and this cavernous mouth have a purpose to serve : it is by their agency the sea-urchin excavates his dwelling-place in the solid rock.

And as such hard work would necessarily wear away the instruments employed in a comparatively short space of time, by a remarkable provision the sea-urchin's teeth are always *growing* at the base in proportion as they are *decaying* at the points. Hence they are ever in excellent condition, like a good workman's tools.

So much for the sea-urchin, which may rightly

be designated one of the most wonderful organisms or creatures in this wonderful world of ocean. "The whole animal," as Mr. Kingsley says, "with his extraordinary feeding-mill (for neither teeth nor jaws is a fit word for it), is enclosed within an ever-growing limestone castle, to the architecture of which the Eddystone and the Crystal Palace are bungling heaps; without arms or legs, eyes or ears, and yet capable, in spite of his perpetual imprisonment, of walking, feeding, and breeding, doubt it not, merrily enough. But this result has been attained at the expense of a complication of structure, which has baffled all human analysis and research into final causes. Conceive a Crystal Palace (for mere difference in size, as both the naturalist and the metaphysician know, has nothing to do with the wonder), whereof each separate joist, girder, and pane grows continually, without altering the shape of the whole, and you have conceived only one of the miracles embodied in that little 'sea-egg,' which the Divine Word has, as it were to justify to man His own immutability, furnished with a shell capable of enduring fossil for countless ages,

that we may confess Him to have been as great when first His Spirit brooded on the deep as He is now and will be through all time to come."

The species most abundant on our British coasts is known as the common sea-egg (*Echinus sphæra*). It has many other common names, one of which, according to Professor Forbes, is "Sca'ad man's head." Its more frequent shape is that of a globe or sphere, but it varies in form, and is sometimes so much flattened that even by erudite zoologists it has been mistaken for other species.

You may find these ocean marbles, these stony balls, of all sizes up to a globe of fourteen inches in diameter. Their colour is reddish or purplish, and their white spines are frequently tipped with purple. They live at different depths in the sea, and, like all their congeners, feed upon animal prey. They are themselves reputed to be excellent eating, and figured as a dainty on the tables of the ancient Roman epicures. On many of the species, as on the green-pea urchin, the sea-gulls banquet heartily, breaking the shells with their stout beaks, and sucking out the animal within.

The green-pea urchin is the smallest of the tribe. When the creature is alive, its shell is green as an emerald, and just of that "brilliant powdery nature which we find on the shelly cases which shield the gauzy wings of some of our brilliant beetles." But on the death of the animal the radiant colour vanishes, and a dull white tint overspreads the entire shell.

There are a number of less known kinds of sea-urchins, distinguished, as Miss Pratt remarks, by names significant of their form, or of some peculiarity in their appearance. Thus we have heart urchins, and fiddle-heart urchins, and cake urchins—names all alluding to their characteristic configuration. And we have the silky-spined urchin, well named from the bright glossy lustre of its spines; and the rosy-heart urchin, whose colour might vie with that of the queen of flowers. Of the four British species of heart urchin, one is very common and diffused through all the seas. Most persons accustomed to roam about in those sandy bays so delightful to the marine zoologist, have seen sea-eggs of this species thrown upon the shore, after the angry waves had spent their wrath upon it. The

common heart urchin, or mermaid's head (*Amphidotus cordatus*) is also often called Child's-head urchin, or Harry sea-egg. It is broadly heart-shaped, much depressed in the middle, and thickly set with fine hair-like spines. Its colour is a yellowish-white, and it is usually about an inch and three quarters long, and very nearly of the same breadth. These animals, and some others of a similar nature, were found, on being opened by Professor Forbes, to have their intestines filled with sand or mud, which they had probably collected along with their usual food, molluscs or crustaceans, or which may have assisted their digestive operations.

Meanwhile, the two cousins had brought their boat safely into harbour, where it was taken charge of by an "old salt" whom Arthur had engaged for the purpose. A weather-beaten, time-worn, but sturdy old seaman, full of strange tales, like most of his race; tales of battle, for, when a mere boy, he had fought at Navarino—of wreck, for he had been twice cast away on inhospitable shores—and of storm, for he had encountered the hurricanes of the West Indies and the cyclones of the Indian Ocean. On one

occasion, he and six others had escaped from their foundering vessel by means of a rudely-constructed raft. Walter's cheek grew pale with horror as he listened to the details of this desperate adventure; how the brave fellows rigged up a spar and a sheet of old canvas to serve as mast and sail, and then abandoned themselves—for they had no rudder—to the mercy of the winds and waves; how their small stock of provisions and water daily decreased, until there was left for each man but two ounces of bread and half a gill of water for the day's allowance; how the weaker among them were unable to endure the exposure to the hot noon-tide sun and the cold night breezes and the tortures of thirst and hunger; how the survivors, after watching with despairing eyes and aching hearts the agonies of the dying, committed one by one the dead bodies to the deep, until only three living men, and these scarcely living, were left upon the crazy raft; and how, after much bitter suffering, when the last bit of bread had been eaten, and the last mouthful of water drunken, and there seemed no hope—no, none—a ship hove in sight, and, attracted by the

strange appearance of their swelling canvas, bore down upon them, put out a boat, and rescued them from the very jaws of death. By



THE RAFT.

such tales as these our ancient mariner frequently held Walter and his cousin spell-bound, so to speak, for an hour or more ; but on the present occasion, as it was growing late, they contented themselves with a few words of kindly greeting, and started across the beach for Walter's brother's house.

On their way they found two objects which suggested some pleasant conversation.

Among a mass of weeds Walter's quick eye discovered a shell of very peculiar character. In shape it was oblong. On one side it was firm and white; but on the other composed of numerous thin delicate layers, which, when scraped by the finger-nail, came off in a kind of white gritty powder.

"What shell is this?" inquired Walter.

"That," replied his cousin, "is the shell of the Cuttle-fish (*Sepia officinalis*)."

"But you don't mean to say that any fish could live inside this hard, firm, and compact substance?"

"No," answered Arthur; "it is the peculiarity of the cuttle-fish that it does not wear its shell, like other shell-fish, as an *external* covering, but as an *inside* plate, which enables it, by its buoyancy, or lightness, to float in the water, and also affords a degree of support and firmness to its soft jelly-like body. This shell was used, before the introduction of blotting-paper, to absorb ink, or to rub out writing that required erasure; it was also considered a valuable medicine, and is still employed in the preparation of tooth-powder. I may add that the eye



of this singular fish is strong and sharp, and lustrous as a pearl ; and that in some parts of Southern Europe the natives string it in numbers upon a silken thread, and wear the ornament as a pearly necklace."

"Let me see," said Walter ; "I have read about the cuttle-fish—something or other—very



CUTTLE-FISH.

curious—oh, I have it ! When pursued by an enemy, does it not discharge a kind of inky matter, which darkens the surrounding waters, and so enables it to escape ?"

"Just so ; and this inky matter is contained in a small bag, which renders the cuttle an important article of commerce. It yields the dark

brownish-coloured substance which painters call sepia."

"Oh, yes, sepia! Mamma uses it in her water-colour sketches, and I have a cake of sepia in my own paint-box."

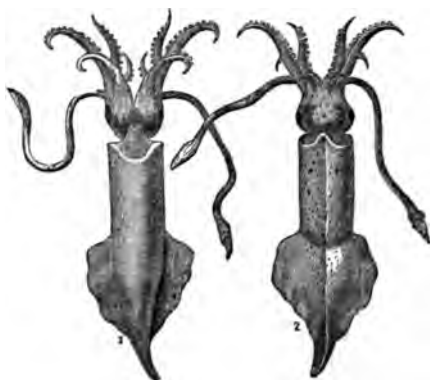
"Here," said Arthur, pushing aside with his foot a strange creature that lay panting on the wet sand; "here is one of the most hideous of fishes; belonging, too, to a hideous family! Hideous, that is, in outward appearance; for in its structure it is marvellously beautiful, like everything which our Divine Father has created."

"I have often met with this grim-looking fish upon the shore," said Walter, "and I intended to ask you its name. Really, it makes one shudder to look at it; and I have noticed that even the very dogs turn from it with disgust."

"I must own that its squat head and glaring eyes, its numerous tentacles, its long narrow body, and its queer tail—like the fluke of an anchor—combine to form a by no means attractive whole. Its common name is the Sea-pen, or Calamary; its scientific, *Loligo vulgaris*. It possesses so great a power of rapid motion that it has been compared to a flying-fish.

Its proper colour is green ; but it can change itself, as you see, to a brownish hue. The fishermen use it as a bait for cod. What made you start, Walter ? ”

“ Did you not see it throw out some water, and then spring backwards ? It did this so suddenly, that I was taken quite by surprise. ”



1. Upper side.

2. Under side.

SEA-PEN, OR CALAMARY (Family, *Loligidae*).

“ That is the way in which it effects its locomotion ; and it propels itself backwards with extraordinary swiftness—nay it will, at need, throw itself out of the water like an arrow, and fall on the shore or the deck of a vessel. ”

“ What a quantity of sea-weed covers the

shore to-day ! I heard the fishermen say it was a high tide last night ; and that, I suppose, accounts for it."

" Do you notice how many different kinds there are?—different in form and structure and properties, but all beautiful, and all useful. For not only do many kinds afford a provision for our coast population, and others prove very valuable in our manufactures from the dyes and chemical substances which they yield, but all are the homes and sources of food of myriads of living creatures. Of their beauty I need say nothing ; you cannot look upon them without *feeling* it : while they fill the mind with pleasant images of far-off shores, and transparent rocky basins, and palm-fringed coral islands, where the sea ever murmurs its sweet but melancholy music."

The two cousins now continued strolling along the beach on their way home, watching the changing aspects of the sea and sky, collecting shells and sea-weed, and suffering not a single object of interest to pass unnoticed.

Pausing to rest for a few moments on the fragment of a huge boulder which, in some

remote time, had been carried down from the cliffs by the action of a sudden torrent, Walter remarked,—

“ You know a lot of jolly tales about shipwrecks and adventures at sea, Arthur, and while we are sitting here you might just tell us one. My head is full of sea-hedgehogs, and cockles, and coral animals, and the like. Can’t you stir a fellow up with some famous good story, Arthur? ”

“ Well, I certainly remember many very affecting narratives of the kind to which you allude. Whether they should be called ‘ jolly,’ I am not so sure. It is not very ‘ jolly,’ as you call it, to hear or read about human suffering, and the dangers incurred by those who go down to the sea in ships.”

“ No ; that part of it isn’t jolly,” answered Walter ; “ and I did not mean to speak as if I had no feeling for men and women in lots of trouble. But I call it jolly when they show no end of courage in pulling through their difficulties, and no end of skill and presence of mind in—in—what do you call it?—adapting themselves to circumstances.”

"That is true," replied Arthur. "I admit there is a kind of proud satisfaction in contemplating the heroism with which our fellows confront the most awful perils, and frequently extricate themselves from apparently overwhelming calamities. But what story shall I tell you? Shipwrecks and burning ships are such frequent catastrophes that their 'name is Legion.' "

"Oh, I leave the choice to yourself, Arthur. Only tell me something that will make my blood run cold!"

"And each particular hair on your head to stand erect, like quills of fretful porcupine, I suppose! Well, yours is a strange taste. But, for my part, I don't think I ever read a finer description of a shipwreck than the poet Falconer's. Whether I can repeat it from memory, I am not certain, but I will endeavour to do so; and at home you can read the passage over, and see if I give it correctly."

"Falconer! Who was he?"

"A Scotch poet, born at Edinburgh in 1732. He served for many years in the Royal Navy; and is supposed to have been lost in the *Aurora*

frigate, when she was on her voyage from the Cape of Good Hope to Bombay in 1770. Having been bred from his youth to a seafaring life, he could write not only as a poet but as a seaman; and his poem of 'The Shipwreck' is, therefore, remarkable for the fidelity and vividness of its pictures."

"Then I shall listen with all the more interest to your quotation."

"This is the passage I so much admire:—

'The moment fraught with fate approaches fast!  
While thronging sailors climb each quivering mast,  
The ship no longer now must stem the land,  
And 'Hard a starboard!' is the last command;  
While every suppliant voice to Heaven applies,  
The prow swift-wheeling to the westward flies;  
Twelve sailors, on the foremast who depend,  
High on the platform of the top ascend,  
Fatal retreat! for, while the plunging prow  
Immerges\* headlong on the wave below,  
Down pressed, by watery weight the bowsprit bends,  
And from above the stem deep-crashing rends:  
Beneath her bow the floating ruins lie;  
The foremast totters, unsustained on high,  
And now the ship, forelifted by the sea,  
Hurls the tall fabric backward o'er her lee;  
While, in the general wreck, the faithful stay†  
Drags the maintop-mast by the cap‡ away!

\* "Immerges,"—the opposite to *emerges*,—"sinks beneath."

† The maintop-mast *stay* is the rope that runs to the foremast-head, and consequently depends on the foremast for support.

‡ The *cap* is a strong, thick wooden block, used to join together the upper and lower masts, as the one is raised at the head of the other



DRIVEN ASHORE.

Flung from the mast, the seamen strive in vain  
Through hostile floods their vessel to regain ;  
Weak hope, alas !—They buffet long the wave,  
And grasp at life, though sinking in the grave ;  
Till all exhausted, and bereft of strength,  
O'erpowered they yield to cruel fate at length ;  
The burying waters close around their head,  
They sink ! for ever numbered with the dead.' ”

Here Arthur's memory failed him ; but we



shall give the conclusion of this animated passage, which Walter, on his return home, read with a lively interest and genuine emotion. We are to suppose the ill-fated vessel driving nearer, and yet nearer, to the inhospitable coast :—

“ In vain the cords and axes were prepared,  
For every wave now smites the quivering yard ; \*  
High o'er the ship they throw a dreadful shade,  
Then on her burst in terrible cascade ;  
Across the foundered deck o'erwhelming roar,  
And foaming, swelling, bound upon the shore.  
Swift up the mountain billow now she flies,  
Her shattered top half-buried in the skies !  
Borne o'er a latent reef the hull impends,  
Then thundering on the marble crags descends :  
Her ponderous bulk the dire concussion feels,  
And o'er upheaving surges wounded reels—  
Again she plunges ! hark ! a second shock  
Bilges the splitting vessel on the rock :  
Down on the vale of death, with dismal cries,  
The fated victims shuddering cast their eyes  
In wild despair ; while yet another stroke,  
With strong convulsion rends the solid oak :  
Ah, Heaven !—behold her crashing ribs divide !  
She loosens, parts, and spreads in ruin o'er the tide.” †

Arthur having brought his recitation from Falconer to a close, Walter renewed his request for ‘a moving tale ;’ and his cousin,

\* The *yards* are the horizontal spars to which the sails are attached.

† The reader will observe that this last line has twelve, instead of ten syllables. It is known in poetry as an *Alexandrine line*.

after a minute or two's consideration, described the well-remembered loss of the *Royal Charter*—an event which, a few years ago, excited a deep sympathy throughout the length and breadth of the land.

The *Royal Charter* was an iron-built screw steamer, and, at the time of her destruction, had only been four years in the service. She sailed from Melbourne on the 26th of August 1859, with 338 passengers on board, besides a crew of 112 officers and men. All went well with her until she reached the Irish coast. At Queens-town thirteen of her passengers landed in a small boat, wholly unconscious of the terrible fate they were escaping. Next day eleven riggers, who had been engaged in working a ship to Cardiff, were put on board—unfortunately for themselves—by a steam-tug, raising the total number of crew and passengers to 448; of whom, alas! only nine-and-thirty were saved.

The cargo was small and light, but very precious; consisting chiefly of gold and specie, to the amount, on the most moderate computation, of not less than £500,000.

A violent gale now commenced, blowing

from the north-east, and buffeted the *Royal Charter* with considerable fury; but, nevertheless, at about eight o'clock in the evening, she made Point Lynas, on the Welsh shore. Captain Taylor, her commander, then commenced throwing up signal-rockets for a pilot, to take his ship into Holyhead; but though the signals were continued for several hours, none appeared. Meantime, the storm increased in fury; the ship was making leeway; and in spite of all the exertions of her crew and officers, she began to drift towards the beach. The night was one of awful darkness—a darkness that might almost be felt; and though both anchors were let go, the gale having increased to a perfect hurricane, their chains parted, and the *Royal Charter* struck the rocks in four fathoms' depth of water.

Even in this terrible strait the crew and passengers preserved the most admirable order and discipline, displaying a patient courage and an heroic composure worthy of the English name.

The masts and rigging were cut and thrown overboard; but the manœuvre afforded no relief

to the labouring ship, which ground and crushed with frightful throes against the jagged rocks.



LABOURING ON THE ROCKS.

The screw got entangled among the drifting spars and cordage; all control over the wreck was lost; and further inland drove the ship,

“broadside on.” The officers, abating not one jot of hope, did their duty gallantly, and were gallantly seconded by their men; but human skill and valour were vain against the fury of the gale and the might of the billows, which lifted up the straining vessel like a plaything, and dashed her helplessly against rock and crag. The scene below deck was one to which no language can do justice. There was a clergyman on board, the Rev. Mr. Hodge, who, with the composure and calmness characteristic of his profession, invited his fellow-passengers to join in a suitable act of devotion. But the agonized throes of the shattered vessel, the deluges of water which swept into the cabin, and the overpowering voices of the storm, rendered his efforts fruitless. Still the officers endeavoured to cheer and encourage the passengers; nor was all hope abandoned until a succession of tremendous seas struck the broadside of the wreck, and literally parted it in twain. The foremost half was almost immediately again divided; nearly all on board were swept into the foaming waves, while those who escaped drowning were crushed to death by the

breaking up of the vessel. A few moments, and, in far less time than it takes us to write these words, upwards of four hundred men and women had passed to their "great account." Captain Taylor was the last man seen on board alive. He was then engaged in lashing himself to a spar, as affording a faint chance of escape; but, in common with every one of the officers, he perished.

The destruction of the *Royal Charter* was singularly complete. The constant grinding and crashing against the rocks reduced its iron-work to shreds; the wood-work was rent into chips and splinters. Mr. Charles Dickens, who visited the spot soon after the wreck took place, observes:—

All who have visited this quarry of Nature, have left it with changed ideas as to the power of water and rock, and the weakness of iron and wood. Waggon's could be filled, he writes, with chips for fire-wood, and iron seems to have acquired the property of floating. Pieces of the latter were strewed wherever you looked in the hollow of the small bay. I saw a beam about twenty-five feet long, weighing many tons,

high and dry, two hundred yards from the stern of the ship; and at a short distance from each side, large pieces of the iron plate, containing three or four square yards; while smaller pieces, with rods and angle-irons, are rent and twisted into all forms.



A LAST CHANCE.

The bodies cast ashore were reverently interred in the neighbouring churchyard of Llanalgo, near Moelfras, about a mile from that part of the coast where the *Royal Charter* was so disastrously wrecked.

Having concluded this melancholy recital,

Arthur suggested that it was time for his cousin and himself to resume their homeward route; but as Walter strenuously insisted upon "one more story," he consented to describe the memorable fate of the *Birkenhead*.

The *Birkenhead* was a troop-ship which sailed from Cork, in 1851, with detachments from ten regiments on board, under the command of Lieutenant-Colonel Seton, to reinforce the garrison at the Cape of Good Hope. The usual proportion of soldiers' wives and children sailed in the unfortunate vessel.

She arrived at Simon's Bay, Cape Colony, on the 23rd of February 1852, where she received instructions to proceed to Algoa Bay and Buffalo River, to disembark her living freight.

She accordingly proceeded to execute this commission on the 25th, and merrily steamed away—a bright clear sky above, and scarcely a breath of wind disturbing the calm mirror-like surface of the sea. But stillness and smoothness are not always signs of safety; and about two o'clock in the morning of the 26th of February, as the *Birkenhead* was apparently progressing with every condition of security



around her, a sudden shock quivered through her bulk from stem to stern.

What could it be?

To the ignorant landmen it foreboded no special danger; but old and experienced seamen knew the imminency of the hazard; and as the timbers creaked, and the framework of the vessel reeled, and the water poured into her hold, they conjectured—what was indeed the case—that she had struck upon a hidden rock. On examination, it was found that a great hole had been torn in the port side, under water, just in front of the paddle-wheel; and the ship rapidly began to fill.

All available hands were now summoned to make ready and launch the boats—the men replying to the call with the utmost self-control and promptitude. Two cutters and a gig were successfully lowered; but an attempt to get out the paddle-box boats failed—the pins of the davits having rusted and become immovable.

All this time the vessel grated and ground against the rocks, with an occasional gasp or shriek that almost resembled the cry of a human being in peril.

The chain-pumps were now plied vigorously; the troop-horses were thrown overboard; the women and children carefully embarked in the second cutter; while Colonel Seton, calling together his officers, impressed upon them the urgent necessity of composure and calmness, and of preserving to the last the discipline and obedience of their men. And never more nobly than on this occasion were the admirable patience and self-denial of the English soldier exhibited. Not a man quitted his station; not a man disobeyed orders; not a man attempted to save himself at the cost or to the neglect of his fellows.

Just at this crisis the *Birkenhead* parted asunder in front of the engine, the fore part of her deck going down with several sufferers clinging to it. There was now no hope of escape; but none attempted to jump into the boats alongside, which had been set apart for the women and children, though the captain of the ship had given the word that all must now do their best to save their lives. One voice, indeed, was heard to exclaim, "Make for the boats!" but Colonel Seton and his officers had

only to remind their soldiers that if they crowded into the boats it must be to the certain destruction of the women and children, and none left their ranks. They stood on the poop of the vessel in perfect order, leaning on their guns, calm and cool, as if they had been upon parade. The officers took leave of one another, and exhorted their men to die with the courage and heroic calmness of English soldiers. Suddenly the vessel broke again crosswise in front of the main-mast, and the poop heeling over with a lurch, plunged beneath the water. The sea was instantly covered, we are told, with a struggling mass of human beings, from amongst whom the strong and skilful swimmer alone had any chance of escape. The cries which then arose, the shrieks of despair, and the vain shouts for help which there were none to render, are described by a survivor as having been peculiarly awful.

“Then rose from sea to sky the wild farewell.”

But all was soon hushed in the silence of death. And in little more than twenty minutes from the time when the *Birkenhead* first struck the

hidden reef, all that remained of her were a few spars and some fragments of timber drifting among the waves.

In this terrible catastrophe no fewer than 438 persons perished—including 9 officers and 348 soldiers—while only 193 were saved. These mostly reached the shore in the ship's three boats, though a few succeeded in reaching the maintop-mast—which, with the rigging and yard-arm, stood upright above the water—and were afterwards picked up by one of the cutters. Others swam to land with the help of swimming-belts, or clinging to spars and broken pieces of timber.

Let it ever be remembered that on this occasion *not a single woman or child was lost*. History does not record a brighter or more beautiful instance of the purest heroism and the most noble self-devotion. It has been rightly said that the perfect order and discipline which prevailed, and the generous consideration displayed towards the feeble and helpless, make the loss of the *Birkenhead*—disastrous as it was in some respects—one of the grandest pages in our naval annals. It is a higher fame, we

think, to have been one of the silent company who, assembled in serried ranks on the poop of the *Birkenhead*, went down into the waste of waters without a murmur, content to die if their self-sacrifice preserved the lives of the women and children,—than to have shared in the glory of Waterloo, or fallen in the soldiers' battle on heights of Inkermann.

While our race is capable of deeds such as these—can exhibit so noble an unselfishness and so chivalrous a heroism—let us not despair of it; let us not think its vigour failing, or its power declining. The soldiers of the *Birkenhead* were no unworthy descendants of the men who conquered in the days of Blake and Cromwell; and "ruled the waves" under the flag of Rodney, Jervis, and Nelson.

Having finished his exciting narrative, Arthur rose from his seat, and insisted upon immediately returning home. The morning was far spent, and he feared that some anxiety might be caused by their prolonged absence.





## CHAPTER V.

**W**HEN the two cousins met on the following day the weather had greatly changed. The sky was lowering; heavy clouds accumulated on the eastern horizon; the wind came and went in short, violent gusts, prophetic of a storm; and an ominous roll of the sea sent the crowding waves against rock and crag in showers of spray and foam.

Under such circumstances, Arthur suggested that they had better abandon their usual morning ramble, and seek some amusement in-doors. Walter willingly consented; and in a few minutes, when the rain began to pour down in veritable torrents, felt very thankful he had offered no opposition to his cousin's prudent advice.

They found no lack of entertainment; and

over books and pictures their lively and varied talk made the hours pass by with only too great a swiftness. After awhile, they ensconced themselves in the snug and curtained recess of the oriel window, which commanded a fine view of the sea, as it tossed and heaved under the mysterious influences of the gale. Here Walter provided himself with a large and richly-illustrated volume, "*The Mysteries of the Ocean*," which treated of the subjects discussed between his cousin and himself during the last few days; and turning over its pictured pages, found numerous opportunities of propounding questions with the view of enlarging his somewhat limited stock of information.

And, in truth, it was a pleasure to ask a question of Arthur Staunton; he replied with such evident willingness, and with so sincere a desire to make his reply perfectly intelligible and satisfactory. He did not silence his querist, as too many persons do, with a few short and almost sullen words, saying as little as possible, and saying that little as ungraciously as possible; but, as far as his knowledge went, communicated it most freely and fully to his hearer.

Walter chancing to alight on a pretty illustration of a coral island, the conversation was directed to that wonder of the deep.



CORAL.

“Coral is the work of an animal, is it not?” said Walter.

“Yes; of one of the lowest types of animal life,” replied Arthur: “of a polype or animalcule, now known by the name of Coralline. Such, however, was not always the opinion even of scientific men. The great Reaumur, whom you will have heard of as the inventor of a thermometer, would not believe it. Coral, he was wont to say, could never have been constructed by sea-nettles or polypes; but Reaumur was wrong in this one important matter.”



"I don't wonder at it; I can hardly understand how this hard solid substance *could* have been built up by tiny little insects underneath the water. Of course I know it *is* so, because I have been *told* so, but I don't comprehend it."

"Let me try, then," replied Arthur, "if I can make it plain to you. The polype, or coralline, is little more in appearance than a kind of whitish membranous tube, something like a telescope in shape, except that it tapers off at the upper end, where it terminates in a disk, or plate, surrounded by eight arms, scientifically termed *tentacula*, or tentacles—"

"I must remember that word—*tentacula*, or tentacles; it comes, I see, from the Latin."

"Which said arms, or tentacles, are each *fringed*, as it were, with numbers of delicate hairs or fibres. The disk with its arms, taken as a whole, is not unlike a star-fish; or, better still, the corolla of a flower. Now, in the middle of the disk, if you look very closely, you will find a small knob or mammal; and on the top of this knob or mammal a small slit, being the coralline's mouth. When it wishes food, it stirs its arms about in the water and produces

a lively agitation, in which if any organism gets involved, it is carried into the coralline's mouth."

"Just like a ship in a whirlpool," exclaimed Walter.

"Precisely so. Well; you don't find the coralline living by itself, like a solitary hermit, but always in conjunction with others of its kind, forming a little colony, which is called a *polypier*. They are united to one another by a common tissue, and form what is usually known as a *coral branch*. This branch consists, I must tell you, of two parts: in the centre lies a hard, brittle, stony substance, which you know well enough because it is the coral sold in shops; and outside of it is a layer of soft flesh, all alive and susceptible of sensation. The central part is named, by scientific men, the *polypier*; the outer, the colony, settlement, or community of polypes. It is covered with knobs or mammals, and each mammal encloses a star-like polype, or coralline."

"Wonderful!" cried Walter. "But there must have been a founder of this colony, I suppose. The commonwealth of *polypes*, as you

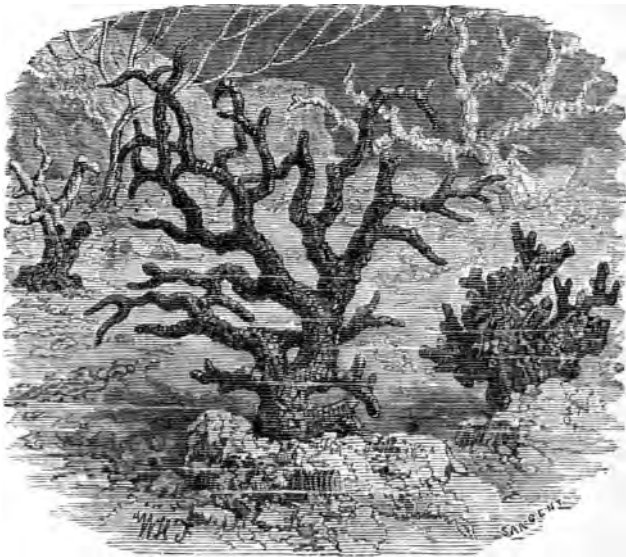
call them, don't spring into existence all at once."

"Certainly not: a mother coralline gives birth to an egg—or, more correctly speaking, the egg is developed into a larva or insect before it is born, and after a certain interval escapes from the maternal mouth in the shape of a little white grub or worm, covered with very fine hairs, which enable it to swim. Examine it carefully, and you will see that one extremity of it is enlarged, the other thin and pointed. The mouth is situated on the latter, which gradually swells and broadens. Eight mammals, or teats, in due time make their appearance, and these mammals quickly stretch out into tentacles. Then the coralline is complete."

"So far I follow you," said Walter; "but even now I don't understand how the one animalcule produces the colony of animalcules."

"I am now coming to that," replied Arthur; "and the way in which it is done may justly be termed one of the most marvellous operations of nature. The coralline attaches itself to a suitable bit of rock, and then begins to sprout

out, or bud, into branches, each branch covered with more animalcules than you could conveniently count ; all these animalcules living an independent life, and yet all combining to form and maintain the polypier, which hardens internally into the beautiful brittle substance called *coral* !”



CORAL.

“ A wonderful process !” exclaimed Walter. “ First the egg, then the worm, then the polype, then the branch of polypes, and, lastly, the

polypier. But now comes another question: How does the polypier—excuse me if I don't pronounce it correctly—how does the poly-pi-er make a coral island?"

"Branch is added to branch, and branch to branch, until a bank or reef is produced; and in the course of ages the reef rises to the surface of the water and expands into an island. I will tell you more about this part of the work presently; but I must remind you, in the first place, that the coral-building polypes cannot live out of water; that they cannot live below a certain depth, wherefore they always begin to build on the summit of some sub-oceanic mountain—the ocean bed, you know, like the surface of the earth, is divided into mountains, plains, and valleys; and that some kinds can only live in smooth, others in agitated water. It is necessary you should remember these facts, Walter, if you would understand the process of formation of a coral island."

"There are several species of coral animals, then, Arthur?"

"Oh yes: they differ much in conformation and mode of living, but all are subject to the

same general laws of growth, and all possess the faculty of secreting a calcareous or stony deposit, of an arborescent or tree-like character. The madrepores, for instance, play an important part in the formation of the coral islands."

"Let us be off to those islands, Arthur, if you please. A change from our stormy bay yonder to the bright sunny waters of the South Sea will be very pleasant."

"Be it so. We are sailing across the Pacific, in the track of Drake, and Cook, and Vancouver, and other famous sea-worthies, and our ship heaves in sight of a beautiful island, enclosing a lake of clear blue water, and fringed with graceful palms. Let us have our boat brought alongside. We jump into it, our boatmen pull away with a will, and in a few minutes we find ourselves reposing calmly in the sheltered lagoon, which forms a commodious and perfectly secure harbour. The island itself we find to be a ring of coral enclosing this lagoon; its average breadth is about a quarter of a mile, its height above the waves some ten or twelve feet.

"Now, see how on the outer side the ring or

circlet shelves down very gradually for about one hundred and fifty feet, after which its sides plunge at once into the unfathomable depths of ocean with as steep a descent as any mountain-precipice. Here is the sounding-line—”

“Where?”

“Foolish boy! Is not all this what children call ‘make-believe?’ —Here is the sounding-line; it measures a mile and a half: cast it out, and yet you will find no bottom. Now, all the coral at a moderate depth below water is alive; all above is dead, being the wreck and refuse of the living part, washed up by the surf, which boils and seethes and roars like a vast furnace, with a noise that can be heard at a distance of many miles.”

“Go on, Arthur; this is what I call *jolly!*”

“On the lagoon side, where the water lies as calmly as in a mountain lake, the encircling reef descends into it by a succession of steps, or terraces, also of living coral, but not of the same species, mind you, with those which build up the foundations and the outer wall. The constant change of water brought into contact

with the coral outside by the rolling billows and clashing breakers is supposed to provide them with a greater abundance of food than they could obtain in a quieter sea ; hence they grow more luxuriantly, and are of a stronger nature. At the same time, as the still water in the interior is less rich in nourishing matter, its coralline inhabitants are of a more delicate form and a much slower growth."

"How deep is the lake or lagoon in the centre of the island? Of course it is not so deep as the sea without."

"The depth varies from twenty to fifty fathoms—that is, from one hundred and twenty to three hundred feet ; and its bottom is mainly composed of living coral, which continually rises higher and higher, through the incessant labours of the little builders, and eventually will reach the same level as the rest of the island."

"Then there will be no lagoon?"

"Certainly not ; but the process of filling up is a very slow one, extending over thousands and thousands of years, owing to the depredations of the marine animals which prey upon the living coral."



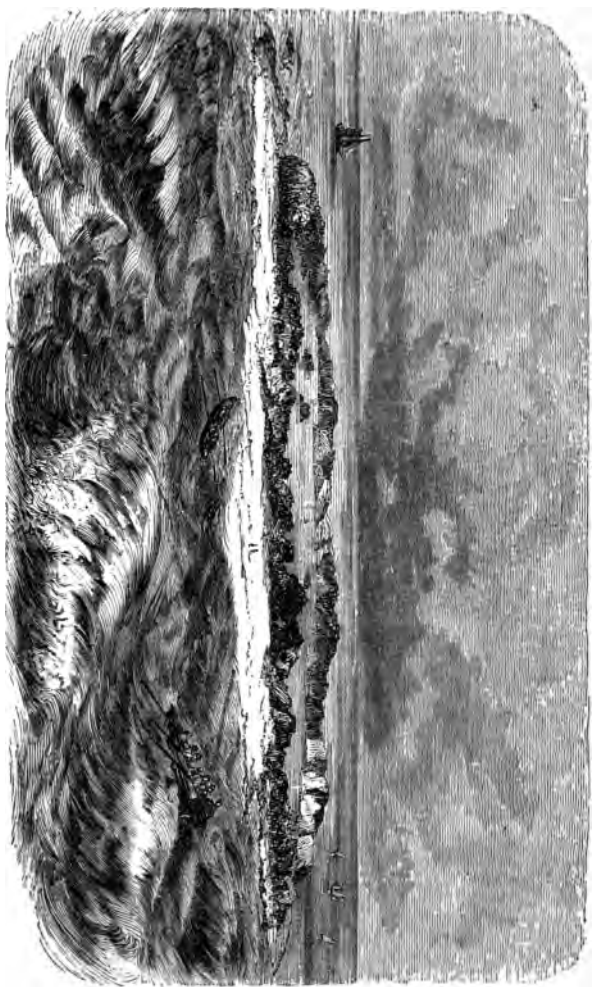
“What a fairy sight the coral isles must present !”

“Yes ; as a distinguished writer, Mrs. Somerville, says : The coral itself is of the most varied and delicate structure, and of the most beautiful tints : dark brown, vivid green, rich purple, pink, deep blue, pearl-colour, yellow, with dazzling white, contrasted with deep shadows, shine through the limpid water ; while fish of the most gorgeous hues swim among the branching coral, which are of many different kinds, though all combine in the structure of these singular islands. Please hand to me the volume on yonder table, by Dr. Darwin, and I will read his description of a couple of islands in the Pacific, by way of more fully illustrating this important subject.”

“Dr. Darwin is a great living naturalist, is he not ?”

“Yes ; and the author of a theory on the origin of species which has excited much attention, but as yet is quite out of your reach. Now listen :—


“‘On the northern or leeward side of Keeling Island,’ he writes, ‘there is an opening through



A CORAL ISLAND.

which vessels can pass to the anchorage within. On entering, the scene is very curious, and rather pretty; its beauty, however, entirely depending on the brilliancy of the surrounding colours. The shallow, clear, and still water of the lagoon, resting in its greater part on white sand, is, when illumined by a vertical sun, of the most vivid green. This brilliant expanse, several miles in width, is on all sides divided, either by a line of snow-white breakers from the dark heaving waters of the ocean, or from the blue vault of heaven by the strips of land crowned with the level tops of the cocoa-nut tree. As a white cloud here and there affords a pleasing contrast to the azure sky, so in the lagoon bands of living coral darken the emerald-green water.'

"Dr. Darwin next proceeds to describe Direction Island. 'Its strip of dry land,' he says, 'is only a few hundred yards in width; on the lagoon side extends a white calcareous beach, the radiation from which, under this sultry climate, was very oppressive. On the outer coast, a solid broad flat of coral rock served to break the violence of the open sea.



Excepting near the lagoon, where there is some sand, the land is entirely composed of rounded fragments of coral. In such a loose, dry, stony soil, the climate of the intertropical regions alone could produce so vigorous a vegetation. On some of the smaller islets, nothing could be more elegant than the manner in which the young and full-grown cocoa-nut trees, without destroying each other's symmetry, were mingled into one wood. A beach of glittering white sand formed a border to these fairy spots.'

"So much for Dr. Darwin's entertaining description; from which you will learn that the chief product of these coral islands is the elegant and useful cocoa-nut tree, one of the most valuable of the great family of palms."

"Oh yes," said Walter; "I have read that it furnishes the South Sea Islanders with almost everything they want. It is what mamma calls a *Multum-in-parvo*, and packs up in itself all kinds of delightful and useful articles."

"Just so; and if you will allow me to forget the coral islands for a moment, I will read a short passage from a book I have close at hand, which gives a very good account of the cocoa-nut tree.



COCOA-NUT PALM.

“Suppose a traveller passing through a tropical country, where a cloudless sun seems to wither up each blade of grass, and convert the earth into crumbling dust, and where human habitations are only to be found at considerable distances. Weary and athirst, the wayfarer at length catches sight of a hut surrounded by some tall erect trees, whose stem bears an immense tuft of green leaves, some upright and others drooping, and all communicating a graceful and

agreeable character to the scene.

“‘At this welcome spectacle the traveller’s spirits revive. He summons up all his failing energies, and is soon beneath the hospitable roof. His host presents him with a cup of pleasant, but somewhat acid drink ; he quaffs, and is refreshed. Then he takes some repose, while the Indian prepares his repast. On the humble board he displays, in a smooth, glossy, and brownish vessel, a variety of meats, and also serves up some wine of a very agreeable flavour. Towards the close of the meal he offers a few preserves, and concludes the whole with a dram of capital spirit. In wild astonishment the guest inquires of his host where, in a desert country, he obtains such an abundance of “good things.” What is his reply?

“‘They are all furnished by my cocoa-nut tree. The water with which I supplied you on your arrival is drawn from the unripe fruit ; some of the nuts which contain it weigh from three to four pounds. This almond, so delicious in its flavour, is the fruit when ripe. The milk you praised so warmly is drawn from the nut. The cabbage, whose succulency you praised, is the floral summit of the tree ; but it is a delicacy

we rarely indulge ourselves with, because the tree from which it is cut dies shortly afterwards. From the cocoa-nut palm we also procure the wine that has made your heart glad. To obtain it we make an incision into the *spathe*, or covering of the flowers, and it flows forth in a white liquor which we collect in proper vessels and christen palm-wine. By exposing it to the sun we make it into vinegar. By distilling it we convert it into brandy. The sugar which



COCOA NUT.

sweetened our preserves was supplied by the sap. The vessels containing our different meats and drinks are manufactured from the shell of the nut. Nor

is this all. The hut in which you have honoured me with your company is also the outcome of this wonderful and all-sufficient tree. The sides are constructed of its wood; and its leaves dried and plaited form the roof. These leaves I also use as an umbrella to protect me in my walks from the sun's burning rays; and from their fibres I weave the clothing which covers

my dusky limbs. If necessary, they might be woven into sails for ships, and the husk that envelops the nut into ropes and cables. Lastly, the delicate oil that has seasoned some of our dishes, and that which burns in my lamp, is expressed from the fresh kernel.' Now, Walter, what think you of the cocoa-nut palm?"

"That it is one of the greatest blessings God has given to man."

"Yes; we may well be grateful for the tree which the poet calls—

‘The loftiest dryad of the woods,  
Within whose bosom infant Bacchus broods;’

—an allusion to the wine extracted from it; we may well lavish our praises on

‘The cocoa’s root,  
Which bears at once the cup, and milk, and fruit.’”

"I vote we go back to the coral," said Walter, "after this long talk about the cocoa-nut. It is nearly eight o'clock, I see, Arthur, and I shall soon have to go home."

"Well; we have had a pleasant chat about the coralline and the coral islands. What more do you want me to tell you?"

"Look here, Arthur: I should like to know



where the coral comes from that is sold in shops and bazaars. On the mantelpiece in our sitting-room at home—I mean, in the house where we are lodging—there is a noble piece, as big as my head. Does that come from the South Sea Islands?”

“No; that is—

‘The coral reddening through the darkened wave,  
Which draws the diver to the crimson cave.’

Most of the coral of commerce comes from the Red Sea and the Mediterranean. It is never found at a greater depth than nine hundred to one thousand feet, nor at a less than ten feet. On some coasts it is noticed to prefer a southerly exposure, on others an easterly; I believe it is never met with on shores which face the north. The coral-fishers begin to search for it about nine miles out at sea, and generally from a depth of one hundred feet to that of nine hundred.

“Let me endeavour to describe the manner in which the coral-fishery of Sicily is conducted.

“The fishing-boats are always of a capital build, strong, sea-worthy, and swift. The

largest measure about sixteen tons, and are manned with a crew of ten or twelve men; the smallest carry only five or six. The prow is usually ornamented with a carved or painted image of the Virgin Mary, or the patron saint of the owner. The fore-part of the boat is appropriated to the master; the stern for the crew and the fishing apparatus: a supply of water and biscuit occupies the centre.

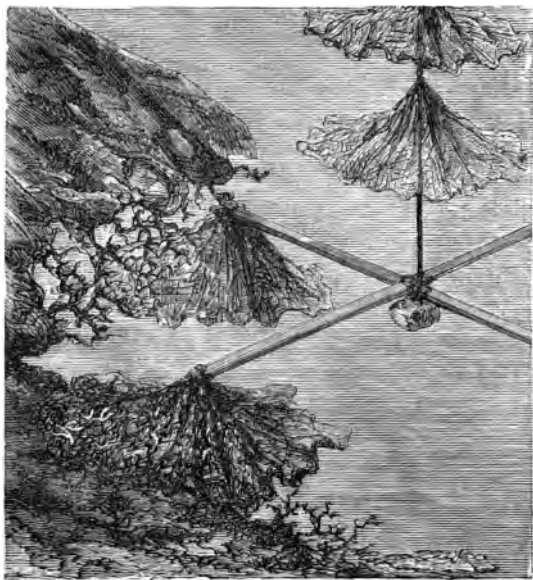
“ The fishing apparatus, as a whole, is called the *engine*. It is constructed in the following manner :—

“ Please to imagine—”

“ Oh, I’ll imagine anything you like, Arthur!”

“ Please to imagine a wooden cross, formed of two solid spars firmly fastened together in the middle, each arm measuring about seven feet in length. Please also to imagine that the centre of the cross is weighted with a heavy stone, or a square lump of lead; and that to each cross-piece is attached a stout rope of about five fathoms, or thirty feet. Now, each rope carries six nets, disposed along its entire length at regular intervals; the said nets being made with great meshes, very loosely knotted together,

and intended to catch hold of whatever they encounter at the bottom of the sea. Finally, a fifth cord, also furnished with six of these nets, is fastened to the point of intersection of the wooden cross, which is thus, as you will per-



CORAL ENGINE.

ceive, supplied in all with thirty nets, or, as they are technically called, *fauberts*. You will understand that when these are dragged through the water in every direction, they cannot fail to

hook themselves on to every projection and inequality of the bed, and the coral is entangled in their meshes by its numerous angularities and protuberances."

"I begin to have some idea of the process now," said Walter.

"Well, when you go coral-fishing, it is evident that the first and principal thing to be done is to discover a coral bank or deposit. You will remember, perhaps, the old story of Madame de Staël. Some person was talking in her hearing of the reputed miracle of St. Denis, the patron saint of France, who walked a mile, it is said, after his head was cut off. '*C'est le premier pas qui coute*,' answered the witty lady.

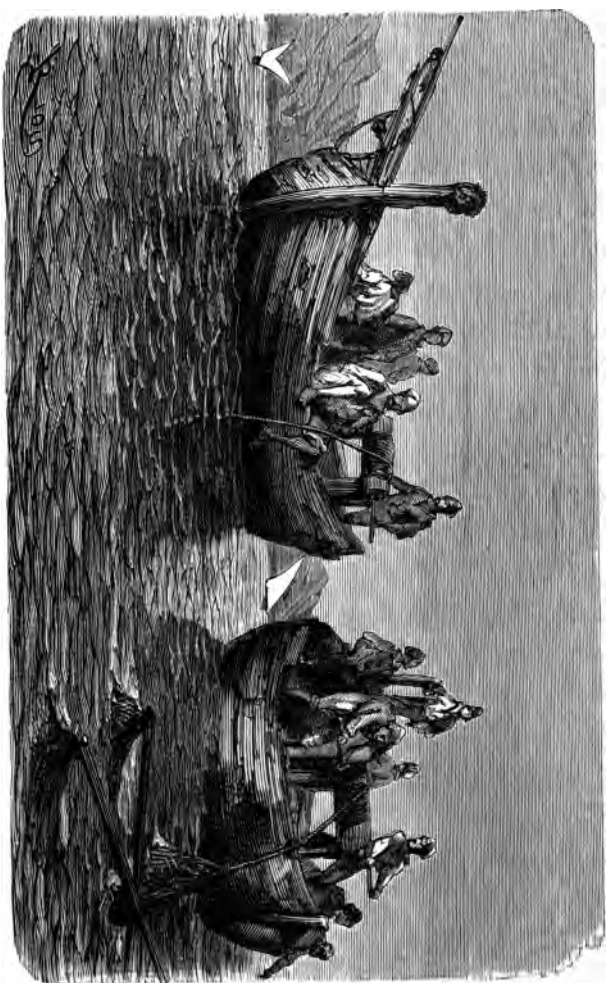
" '*Le premier pas?*' Oh, I have only just begun to learn French, Arthur. Pray give me plain easy English."

" 'The first step is all the difficulty,' said Madame de Staël; and so, in coral fishing, after you have found a coral bank it is plain sailing enough. You and I, Walter, would be puzzled to hit on the right spot, but not so the coral fishers. Practice makes them perfect. They take note of every undulation and peculiar

feature of the coast, and from these indications seem able to map out in their minds the irregular surface of the ocean-bed, so as to know with perfect accuracy its various hollows and eminences ; just as one who has dwelt long in a village or town becomes acquainted with the bearings of every street, and the position of every house. To such an extent do some of them carry their skill, that they will fish up from the bottom of the sea an engine which they have left there for upwards of a twelve-month."

"How exact must be their knowledge !"

"I have now to describe the fashion in which the engine is manœuvred :—They launch it into the sea, where it floats on the surface, supported by a cable. This cable, attached to the middle of the cross, is wound upon a windlass. Seated on the gunwale of his boat, the master lets one leg hang overboard, in such a manner that the rope rests upon his thigh, which is protected by a lempiece of good stout leather. According to the pressure of the rope, he determines the condition of the bank of coral, and the opportune moment for letting go the fishing-apparatus



CORAL-FISHING IN SICILY.

with the weight intended to sink it. He immediately cries, 'Let go!' the men ply the windlass vigorously, the rope is paid out, the engine catches in the hollows or projections of the rocks; it is hauled up, and again lowered; and this operation continues until, all the nets being loaded, the fishery is terminated.

"But at the cost of how much suffering is the precious cargo obtained! Hitherto the work of the fishermen has been confined to rendering as inextricable as possible the entanglement of the nets among the inequalities of the ocean-bed; but to haul on board the engine, they must collect all the spoils it has seized. Exposed to a burning sun, great drops of sweat gathering on their tanned brows, their veins swollen and rigid as ropes, they man the windlass! So terrible is the toil, that it would be impossible for them to continue it, if they did not incessantly recruit their energies with the biscuit purposely placed within their reach; hence an Italian proverb says that the coral-fisher is always eating."

"And he need do so," exclaimed Walter: "I always thought a railway navvy worked

hard, but a coral-fisher seems to work much harder."

"He works under a scorching sun; and, besides, his master does not forget to stimulate him occasionally with a blow. He gets no rest, for when he is not at the windlass he has to repair the nets—which wear out very quickly—or to make new ones; and to this kind of work he grows so accustomed, that you may see him knotting and splicing the meshes when worn with fatigue and almost asleep."

"How long at a time do they slave like this?"

"A day's work is counted at *eighteen hours*."

"*Eighteen hours!* What would our English labourers think of such a spell of work?"

"Their day is counted at eighteen hours; their bill of fare consists of biscuit and water without stint, Italian *pâtes* in the evening, and twice a year, on the great religious festivals of Lady's Day (Assumption) and Corpus Christi, meat and wine. As to their wages, the best seamen receive from 400 to 600 francs for the summer season of six months—that is, from £16 to £20; the less skilful about half



these sums: and the fare being so poor, the pay so low, and the work so hard, it has become a common saying that one must be a thief or a murderer to go as a coral-fisher!"

"Their lot is certainly very painful," said Walter.

"And few of them bear, or deserve, a good character. However, when the first net is cast at the beginning of the season, they fling themselves on their knees, as if they were the most devout of Christians; and the first fine branch of coral which they draw from the deep is offered to the Virgin—provided always that the fishery is likely to prove profitable!

"The coral is not sold to purchasers by the boatmen, but by their employers; and the principal markets on the coast of Africa are at Bona and Calle. Thither is carried the entire produce of the Mediterranean fisheries."

"As there are different kinds of coral-builders, Arthur, I suppose there are different kinds of coral. In fact I know that such must be the case, because I have seen both red and white coral."

"The *red coral* chiefly comes from the

Mediterranean. It has a shrub-like or arborescent form, grows to the height of about twelve inches, and is about as thick as a man's little finger."

"Does it *all* come from the Mediterranean?"

"No; it is also found in the Red Sea and



CORAL BRANCH AND POLYPES.

Persian Gulf. The *white coral* differs from it only in colour, and is therefore regarded as a variety of it. Not being so frequently met with, it fetches a higher price in the market.

"Then there is *black coral*, which is highly prized on account of its solidity. It is said to

owe its colour to the sulphurous emanations of the mud of the sea-bed, into which it has fallen, when broken off, by some accident, from the parent mass.

“Commercially, the value of the common coral mainly depends on the shape of its branches; but whether its tint is more or less red, or more or less transparent, will also influence the price. It is polished by the jeweller, and adapted to many ornamental purposes, as for pearls or beads, carved objects, bracelets, rings, necklaces, and the like. As a commencement, it is smoothed or rubbed down with lime; afterwards it is ground upon horizontal disks—like the lathes made use of by opticians in fashioning glass and crystal—with the help of a paste of emery and water, which is made very coarse at first, but at last reduced to an impalpable powder. But, Walter, it is time we brought our long lecture to a close.”

“Oh, I could listen to you for another hour, Arthur! It is so delightful.”

“Will you pass over to me mamma’s copy of Montgomery’s Poems?”

“Is this the book?—Yes, I see; ‘Poetical

Works of James Montgomery.' Are they worth reading?"

"I am going to repeat a passage from a poem called 'The Pelican Island,' and if you like it, I will lend you the volume to study at your leisure. As it refers to the coral animals and their work, it will fitly conclude our discussion:—

'Millions of millions thus, from age to age,  
With simplest skill, and toil unweariable,  
No moment and no movement unimproved,  
Laid line on line, on terrace terrace spread,  
To swell the heightening, brightening, gradual mound,  
By marvellous structure climbing towards the day.  
*Each* wrought alone, yet *all* together wrought,—  
Unconscious, not unworthy instruments,—  
By which a Hand invisible was rearing  
A new creation in the secret deep.

I saw the living pile ascend,  
The mausoleum—'

"That is, the tomb, or sepulchre—

—' of its architects,  
Still dying upwards as their labours closed :  
Slime the material, but the slime was turned  
To adamant by their petrific\* touch ;  
Frail were their frames, ephemeral their lives,  
Their masonry imperishable. . . .  
Atom by atom thus the burthen grew,  
Even like an infant in the womb, till Time  
Delivered Ocean of that monstrous birth—  
A coral island stretching east and west.'"

\* *Petrific*—petrifying, converting into stone.

"Capital!" cried Walter; "I will borrow the book of you, Arthur, if you please."

"By all means; it will amuse you, I think, during my short absence at Winterton, where I am called on important business. You have learned by this time how much there is, not only of instruction, but of entertainment, of the romantic as well as the useful, in the science you thought so frightful. So go on with your studies, my dear lad, while I am away, and try to learn something new every morning—*one* little fact, if not two, or two if you can't master four; and, take my word for it, Walter, you will never regret the days you spent at the sea-side."











